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ORIGINAL ARTICLES

AN ADDRESS
TO THE
ROYAL COLLEGE OF PHYSICIANS*
BY
THE PRESIDENT, SIR CHARLES WILSON

You know already that this College is very old, that the line of your presidents reaches in an unbroken chain back to the second Tudor king. You may be told presently that the frailty of great age has overtaken this ancient foundation, that it has gathered moss, and that the medical bodies which are known to you—the Medical Research Council, the General Medical Council and the like—came into being to discharge duties which once were ours and which were taken from us because we had neglected them. Men as they grow older have always sighed for lost opportunities since Horace sang:

Eheu fugaces, Postume, Postume . . .
Oh for the years that are lost to me, lost to me.

What fellow has not wished that the College had given birth to the Association of Physicians, and that the *Quarterly Journal*, *Brain*, *Heart*, and publications of this pattern, which are the growing edge of medicine, went into the world from our own College press?

But all this is gone and done with. No man who does things goes mumbling about the past for long. This College is what we make it. If there is anything wrong with it, it is within our power to set it right. If we do not it is we, and we alone, who are to blame. We are too conscious of what our forebears left undone; too slow to recognise what they did, and did well. Here in this College, gathered under one roof, are more than six hundred fellows, the leaders of every branch of our calling, save our surgical brethren with whom we live in happy harmony. It seems to me a fine example of foresight and good planning. We as fellows welcome it because it enables us to fulfil the first function of the College—to be ready, when the Government of the day comes to us for counsel, to speak with the knowledge that we do so for all the leaders of our profession. We shall speak even more effectively if we are certain what is in the minds of our full fellowship, what is the corporate opinion, the corporate policy, of the College. When the College moves, when fellows meet daily, contact will help to crystallise this opinion.

The College has other functions. I hope that presently funds may be placed at the disposal of our librarian to make of our library, with its treasures, a national museum of the history of medicine, to which men will come from the English-speaking world. I hope too that when the College moves, as we shall move after the war, it may be possible to endow a research fellowship, and that provision may be made in our new building for laboratories. It has been felt that this College, which is the home of the leaders of our calling, could do more to promote the advancement of learning.

But the first purpose of this college, which dwarfs all others, is and always must be to explain to whatever Government may be in power the considered views of those who lead our profession. We may be asked ultimate questions, we may be asked the meaning of education, or at any rate it may be demanded of us whether we are satisfied with the student's education. If we are frank I think we shall confess that we are far from satisfied. Here is an examination paper in history given to me by a boy of 16. It was not set to a few promising lads, but to 98 boys in a single school. Fellows will note that of the fifteen questions in the paper the boys were required to answer only four. A wise examiner was bent on finding ground where the boy knew his facts, so that he, the examiner, might test how he could handle those facts, how far he could use his wits, and to what degree his power of reasoning had been developed. Here—and the contrast is disconcerting—is a paper set in the Conjoint medicine. The questions seem to demand junks cut from a textbook; they are tests of memory or attempts to ferret out some small spot in the wide field of medicine where the student might be surprised without his facts. This first impression is borne out by a scrutiny of the questions set in the two papers. The boy of 16 is asked:

1. What type of class or personal privilege would you consider to be justifiable and what indefensible?
2. "Sea-power can prepare for victory in a war; it can never complete it." Do you think history bears out this dictum?
3. Discuss in your own words the character and resultant behaviour of any personality in any novel that has interested you.
4. Give an example from European or Old Testament history of the value to humanity of fanaticism.
5. "We cannot restore, we ought to recreate." Discuss the bearing of this dictum on any building that you know that has been injured by bombing.

If this boy should become a medical student, we take charge of his education for six more years, and at the end we ask him to reproduce, as faithfully as may be, some page of the standard textbook: the signs and symptoms and treatment of bronchiectasis or some equally recondite problem. We are turning the student in the clinical years into a mere scavenger of facts. We have to extirpate this blind cult of memory and the stored fact. We have to ask how the quick curiosity of the average child has been converted into the dull drudge we so often encounter in the finals; where and how we have violated the canons of education. We have to admit that a man is not safe because he has seen diseases but only in so far as his power of reasoning has been developed.

* * *

If we are to answer questions of this kind we must be prepared to take a step in advance of public opinion, we must be ready to lead. For what purpose would there be in bringing together the leaders of our calling unless to lead? It is therefore fitting that we should inquire what are the particular qualities of leadership that we may reasonably look for in a fellowship such as ours. Detachment and disinterestedness certainly, for they are the fruit of a scientific training. But I think we might ask for more and demand two qualities of leadership: moral courage and a willingness to accept responsibility. They are the rarest virtues in a democracy; their very rarity is a source of anxiety to the thoughtful student of our times. I would not care to end on a sombre verdict of that kind, nor is it necessary while we still possess in our Prime Minister an almost sublime example of the tranquil acceptance of responsibility not only for thousands of lives but indeed for the fate of the world.

The College will ask more of fellows in the future than it has required of them in the past. I do not think it will ask in vain. Many of you must have read with dumb pity the brief chronicles in the *Times* of airmen who have fallen in battle. Their stories had hardly begun, and yet there was enough to tell us that in their own schools and colleges they were already the leaders of their generation. While this is happening, while the real wealth of our race is being spent, I do not believe that any fellow—that any Englishman—would wish to pursue exclusively those personal aims and hopes and aspirations natural to other times, at any rate until peace comes, until

Night's candles are burnt out, and jocund day
Stands tiptoe on the misty mountain tops.

* Addressed to new Fellows on the occasion of their admission to the College.

DIPHTHERIA BACILLI IN FLOOR DUST

BY

W. E. CROSBIE, M.B. BELF., D.P.H.
MEDICAL SUPERINTENDENT OF ALDER HEY CHILDREN'S HOSPITAL, LIVERPOOL

H. D. WRIGHT, M.D., D.SC. EDIN., M.R.C.P.E.
PROFESSOR OF BACTERIOLOGY, UNIVERSITY OF LIVERPOOL

IT has been pointed out previously (Wright et al. 1941) that virulent diphtheria bacilli can often be found in large numbers in dust from the floor of diphtheria wards. It is clear, therefore, that steps taken to prevent cross-infection in hospital, and possibly to prevent respiratory infections in general, must be designed with reference to this fact. Before we can decide to what extent infection is disseminated directly through the air from one patient to another it is necessary to know more about the extent to which dust contributes to the bacterial content of the air. Only when this source has been removed can any conclusions be drawn as to the importance of other sources. In this paper we record further observations on this subject with particular reference to the frequency of diphtheria bacilli in dust and the efficiency of various measures currently adopted for their destruction and for the prevention of contamination of air from this source.

METHOD

The dust was collected from the ordinary ward sweepings and placed in 6 in. by 1 in. test-tubes. In the laboratory an amount of broth about equal to the volume of the dust was added to the whole or part of the sample; the mixture was well shaken and then stirred up with a sterile glass rod or thick Nichrome wire. The coarse particles were allowed to settle out and a large loopful of the supernatant fluid was streaked over three 3-in. plates of Hoyle's medium (Hoyle 1941). No attempt was made to count the exact number of diphtheria bacilli present. After 18–24 hours incubation diphtheria bacilli can usually be detected readily and their type determined; gravis colonies are easy to recognise and intermedius colonies usually not difficult, but mitis strains are often hard to distinguish from other organisms. The diphtheria bacilli were isolated and the type determination checked by fermentation tests; in certain cases the virulence was tested by subcutaneous inoculation into guineapigs (Holt and Wright 1940). All gravis and intermedius strains so far tested have proved virulent but some mitis strains were non-virulent.

Contamination of air has been tested by the exposure of 3-in. plates of Hoyle's medium for various times (usually an hour) on tables at about 3 ft. from the floor. The number of colonies of diphtheria bacilli was counted at 48 hours together with the number of easily visible colonies of other organisms.

STRAINS FOUND

We have examined 44 samples of dust from the untreated floors of wards in fever hospitals. In 5 no diphtheria bacilli were found (2 from scarlet-fever wards, 3 from diphtheria wards). In 37 samples diphtheria bacilli were present, sometimes in extremely large, sometimes in small numbers. Gravis strains alone were found in 22 specimens, gravis and intermedius in 7, gravis and mitis (virulent) in 3, gravis, intermedius and mitis (virulent) in 3, and intermedius alone in 2. The predominance of gravis strains reflects the high incidence of this type in infections in Liverpool at present (Wright 1941), but may have been exaggerated because the gravis colonies are so much easier to detect in mixtures.

In a babies' hospital, 3 samples from wards in which diphtheria had occurred contained gravis, intermedius, and gravis plus intermedius strains respectively, accurately reflecting the ward distribution of the infections. Of 8 samples from air-raid shelters at one or other of these hospitals, 3 contained no diphtheria bacilli; 2 of these were from floors recently disinfected. From the other 5, gravis strains were readily isolated. In one shelter the dust had previously proved free of diphtheria bacilli after disinfection; the shelter was used during an air-raid the next night and on the following morning the dust contained a large number of gravis organisms.

We have also examined 32 specimens from the floors of the wards of a large children's hospital, part of which was used temporarily for adult patients. From 18 samples, including all those from adults' wards, no diphtheria bacilli were isolated. The remaining 14 samples all yielded diphtheria bacilli: gravis 9; gravis and non-virulent mitis 1; intermedius 2; gravis and intermedius 1; and non-virulent mitis 1. In 11 instances the types bore reasonable relationship to cases or carriers found in the ward before or just after the examination of the dust. In 3 others no cases were known to have been in the ward recently. The diphtheria bacilli were found in 5 general medical wards, 4 isolation cubicles, 2 ear wards, 1 general surgical and 1 unused ward and 1 sick bay for nurses. In 1 ward we were able to isolate diphtheria bacilli (gravis) from the dust on a window ledge.

SURVIVAL OF DIPHTHERIA BACILLI IN DUST

It appears from our evidence that diphtheria bacilli are not usually found in dust except in relatively close proximity to diphtheria cases or carriers; they can, however, persist in a virulent condition in dust for a considerable time. We have stored naturally infected dust in test-tubes in a cupboard, shielded from direct light but not darkened, with the results shown in table I.

TABLE I—SURVIVAL OF DIPHTHERIA BACILLI IN DUST IN VITRO

Sample	First examination		Second examination		Length of survival
	Date	Result	Date	Result	
	1940		1940		
1	Oct. 7	G moderate no., M few	Oct 14	G numerous	7 days
2	,,	I few	,,	G and I few	
3	,,	G few	,,	G few	
4	Oct. 21	I very numerous	Nov. 22	I (virulent) moderate no.	1 mth
5	,,	G very numerous	Nov. 20	G numerous, I few, both virulent	
6	,,	G very numerous	Dec. 18	G moderate no., virulent	2 mths
7	,,	G numerous, I and M few	Dec. 21	Negative	..
8	Oct. 28	G numerous, I few	Dec. 10 1941	G moderate no., virulent	6 wks
9	Nov. 12	G numerous	Mar. 3	G few, virulent	102 days
10	Nov. 19	G moderate no.	,,	Negative	..

G = gravis, I = intermedius, M = mitis.

It will be seen that some organisms survived for over three months and were still virulent. The number seemed to diminish with time, but no accurate counts were made. In samples 7 and 10 it is just possible that there was some antiseptic present, but we cannot be sure of this. Our evidence is not sufficient to indicate that one type survives longer than another. The impression we have is that gravis strains do so, but this may simply be because they tended in these samples to be present in larger numbers than the other types and were the easiest to detect on the plates when present in small numbers among numerous other organisms.

These experiments in test-tubes are a fair approximation to natural conditions but we have by a fortunate accident been able to study the matter still more closely in one ward.

This ward had been used temporarily for cases of diphtheria and from its dust organisms of the gravis type had been isolated in large numbers on many occasions in the course of experiments on the effect of oiling. On Feb. 24, 1941, demands on hospital accommodation required that this ward should be made available for other purposes. Accordingly the diphtheria patients were removed elsewhere; the bed linen was disinfected and sent to the laundry; all washable surfaces of furnishings were washed with 1 in 40 phenol; screens, pillows and mattresses were exposed to formalin vapour in a small room and the ward walls and window ledges were sprayed with formalin and washed. The floors were not specially treated. New patients, none of them suffering from diphtheria, were admitted next day. The floor dust was examined at weekly intervals. Diphtheria bacilli of the gravis type were found in the dust collected one week later (March 2), a moderately large number after a fortnight and again after three weeks (March 10 and 17), and a few, still virulent for guineapigs, on March 25 and 31, five weeks after the diphtheria patients had been removed and the ward "fumigated." On March 25 the nose and throat swabs from all patients and

staff in the ward revealed no diphtheria bacilli of the gravis type; one patient provided an avirulent mitis strain.

It is evident therefore that virulent bacilli of the gravis type may persist on an oiled floor for at least a month. The ward experiment amplifies and confirms the test-tube observations. Whether the organisms would persist equally long on an unoiled floor we cannot say.

CONTAMINATION OF AIR FROM FLOOR DUST

Two wards were available for studying air contamination; each contained 20–25 patients. All diphtheria types were represented but it was not possible to swab each patient when the dust samples were collected. Strict bed isolation was enforced and the nurses wore masks made of two layers of gauze with a strip of Cellophane in a pocket between them, in one ward during all the time they were on duty, in the other only when attending on a patient. One ward (L2) had not been oiled, but the other (M1) on the day prior to the experiment was treated for the third time with spindle oil as recommended by van den Ende and his colleagues (1940). Six plates of Hoyle's medium were exposed 3 ft. from the floor at equal intervals along the middle of the ward for an hour during and after sweeping. The sweeping was

TABLE II—DIPHTHERIA BACILLI ON PLATES EXPOSED 3 FT. FROM GROUND FOR AN HOUR DURING AND AFTER FLOOR SWEEPING

Dust contained	Ward L2 (unoiled)		Ward M1 (oiled)	
	Numerous G; few I		Few G; few I	
Plate	Colonies	*C. diphtheriæ*	Colonies	*C. diphtheriæ*
1	155	4 G, 2 I	7	0
2	106	0	2	0
3	125	0	4	0
4	58	3 G	9	0
5	81	1 G	10	0
6	30	0	4	0
Total	555	8 G, 2 I	36	0

done from the sides to the middle of the ward and then towards the corridor entrance. Plate 1 was at the corridor end of the ward, plate 6 at the opposite end and the others between. The results are given in table II.

In the unoiled ward a considerable number of organisms of all kinds rose from the floor and among them some diphtheria bacilli. In the oiled ward the air was much less heavily infected and yielded no diphtheria bacilli. Further experiments at intervals up to twenty-five days gave similar results. In a previous experiment, plates exposed in L2 (unoiled) provided 935 colonies, 24 containing diphtheria bacilli of the gravis type, while those in M1 (oiled twice) yielded 190 colonies, 2 containing gravis-type bacilli. The diphtheria bacilli and the other colonies tended to be more numerous towards the door in the unoiled ward but showed this tendency less in oiled wards.

Diphtheria bacilli evidently rose into the air during sweeping, and, considering the height at which the plates were placed and the small area exposed (7 sq. in. per plate), the total number raised at any one sweeping may well be quite large. Treatment of the floor with spindle oil appeared to have reduced the number so lifted into the air; two treatments in M1 produced some effect, but a satisfactory result was not obtained till after a third treatment and this maintained its effect for at least twenty-five days, though by this time the number of diphtheria bacilli in the dust was very small. All through this series of experiments the number of diphtheria bacilli on the oiled floor was less than on the unoiled floor (L2). The floor of ward L2 was therefore oiled and observations continued till the patients were removed (table III).

One oiling reduced the contaminating effect of sweeping but even three did not completely abolish it. We may be certain that the contamination of the air in the last two examinations did, in fact, come from the dust, because there were no patients or staff with positive swabs in the ward at the time. The reduction of dust by

TABLE III—EFFECT OF OILING THE FLOOR ON THE BACTERIAL CONTENT OF THE AIR

Date of examinations	Treatment of floor	Bacterial content of dust	Bacterial content of air (6 plates) *	
			Colonies	*C. diphtheriæ*
Jan. 13	Untreated	Numerous G and few M	935	24 G
,, 23	,,	Numerous G and moderate no. I	555	8 G + 2 I
,, 28	,,	Moderate no. G and few I	539	7 G + 8 I
Feb. 14	After first oiling	Numerous G	232	3 G
,, 20	After second oiling (on Feb. 19)	Very numerous G, few I	93	1 G
Mar. 2 †	After third oiling (on Feb. 24)	Numerous G	78	1 G
,, 17	,,	Moderate no. G	137	1 G

* Exposed during sweeping as described above.
† All diphtheria patients had left ward by this date.

oiling was evident to the sisters in the ward and reduced greatly the amount of dusting necessary. It could readily be seen from the great diminution in fragments of fluff and so on which fell on the plates. We have only once seen diphtheria colonies closely associated with such fragments. While diphtheria patients were still in ward L2 (unoiled) we were able to demonstrate diphtheria bacilli in the air at times when sweeping was not being done, but in much smaller numbers (table IV).

Whether the organisms in the air here came from the floor or not could not be decided but we have tried to determine this in another experiment in a cubicle. In this cubicle was one patient with a gravis infection. The floor was mopped over with a 50% solution of a proprietary preparation of phenols in an emulsified form (the concentration recommended for washing floors is 1 in 400). After this treatment no diphtheria bacilli were found on the floor during the next three days though there had been large numbers of gravis organisms before. Seven hours after a second similar treatment of the floor, 3 plates were exposed for an hour during and after bed-making; on these plates 69 colonies appeared, 2 of them containing the gravis type of diphtheria bacillus. The dust from the floor was almost sterile and contained no diphtheria bacilli. Five days later, after further similar disinfection of the floor, 2 plates were exposed for two hours during a quiet period before bed-making and 2 others for an hour during and after bed-making. During

TABLE IV—BACTERIAL CONTAMINATION OF THE AIR UNDER DIFFERENT CONDITIONS

Date	Conditions	Contamination of air		
		No. of plates	Colonies	*C. diphtheriæ*
Feb. 5	During and after sweeping	6	539	7 G + 8 I
,, 12	During quiet period	3	33	1 G
,, 12	During bed-making	3	142	1 G

the quiet period the plates collected 14 colonies but no diphtheria bacilli, and during bed-making 96 colonies, 2 of them *Corynebacterium diphtheriæ* gravis. These organisms must have come from some place other than the dust on the floor, for this was found to contain no diphtheria bacilli. It seems highly probable that they came from blanket fluff and not direct from the patient.

We have not been able to trace the passage of diphtheria bacilli from the floor to the throat of a patient but we made one suggestive observation in an experiment in which 2 nurses wore masks, made of a layer of cellophane between two layers of gauze, while engaged on their duties in the ward during sweeping operations. Each mask was dissected after use, the outer layer of gauze being placed in one test-tube, the cellophane in another and the inner layer of gauze in a third. Each was covered with broth and well stirred up with a sterile straight wire. Direct plating of the broth yielded no

diphtheria bacilli, but after incubation for eighteen hours the outer layer of one mask provided a culture of bacilli of the *gravis* type. No diphtheria bacilli grew from any of the other 5 specimens. The organisms were thus traced, if not into, at any rate to very near the nurse's nose and throat.

The effect of oiling a floor was seen above to be considerable but variable. One of our experiments suggests that it may in part be determined by the state of the floor before the oil is applied. Two wards (A and B), each containing 10–12 patients, were selected for further oiling experiments. Before treatment ward B was thoroughly scrubbed but ward A was not. The results of plate exposures during and after sweeping are shown in table V.

TABLE V—EFFECT OF THE STATE OF THE FLOOR ON THE BENEFICIAL EFFECT OF OILING

—	Floor dust	Contamination of air during sweeping *	
		Total colonies	Diph. colonies
Ward A (oiled)			
Before treatment	Mod. no. G.	98	2 I
After treatment	Mod. no. G, few I	57	0
Ward B (scrubbed and oiled)			
Before treatment	Very numerous G	91	4G
After treatment	Numerous G	3	0

* 3 plates exposed for an hour during and after sweeping.

The number of organisms that rose into the air from the floor which had been scrubbed before oiling was very much less than that from the unscrubbed floor. Scrubbing, however, did little to reduce the number of diphtheria bacilli on the floor. It seems not improbable that the effect of sweeping may differ with different kinds of dust and that the effect of oiling may vary according to conditions. This experiment suggests that a preliminary thorough cleaning of the floor may add to the value of oiling.

It is natural to inquire whether bacilli in the dust do, in fact, ever infect persons exposed to them. This is difficult to answer but events in ward L2 (table III) are of some interest. On Feb. 20 gravis and intermedius strains were found in the dust, on March 2, 17 and 25 gravis strains only and on March 31 gravis and intermedius strains. The number of intermedius organisms was always small and the failure to find them on three occasions may simply be due to the technique used. On March 25 no gravis or intermedius organisms were found in the throat or nose of any patient in the ward. On April 8 a patient who had been examined at the previous swabbing developed a nasal discharge from which intermedius organisms were isolated. On swabbing the ward again one patient was found to be carrying organisms of the gravis, and another of the intermedius, type. Both had yielded negative swabs on the previous occasion and both had been in hospital some weeks. Two sources only seemed at all probable: the floor or a visitor. The floor had been oiled and we had evidence that the number of organisms rising from it was small (table III), but some did rise and it must be remembered that the patients were children and that their toys might fall to the floor and later go to their mouths or noses. We think there is a good case for trying to remove the risk which lies in infected dust.

DISINFECTION OF FLOOR DUST

Disinfection of rooms or wards previously occupied by patients suffering from diphtheria is part of the ritual of most health authorities and hospital administrations. In this city it consists in hospital of what is locally referred to as "stoving." This term in one of our hospitals was explained as meaning "the closing of all windows and doors and spraying of formalin throughout" (quantity per volume not specified). "The place is then left closed for a period varying from two to twelve hours. Then the windows and doors are opened for as long as possible." Little or nothing in the way of antiseptic floor-washing appears to be practised. In another hospital "stoving" means exposure of the small ward and its contents to formalin generated by heat in a proprietary apparatus. The method is not used in large wards. The corporation disinfecting service which deals with private houses seals all windows, fire-places, ventilators and other openings. The spraying solution consists of 4 oz. of formalin to a gallon of water (2½%); a pint of this is used per 1000 cu. ft. It is sprayed from a pressure pump (40 lb. per sq. in.), and ceiling, walls, skirtings and floors are given particular attention. At the end of the process the door is securely fastened and sealed on the outside. A responsible person is advised to keep the room sealed for twenty-four hours if possible; if not, for at least eight hours from the time of disinfection. We have made a few observations on the effectiveness of these procedures (table VI).

It is clear that the hospital procedures have been on the whole remarkably ineffective, no doubt partly because of defective technique. Observations on the more elaborate ritual for domestic bedrooms are as yet too scanty to report. Merely scrubbing a floor, as was noted above, did not greatly reduce the number of diphtheria bacilli in dust. In one instance thorough mopping of the floor of an air-raid shelter with a strong solution of Jeyes fluid completely eliminated a very heavy infection of the dust with gravis organisms. Similarly, mopping a cubicle floor with a 50% solution of a proprietary preparation containing 40% of phenols destroyed a heavy infection with diphtheria bacilli. But a similar disinfectant in a dilution of 1 in 140 (the concentration recommended by the Ministry of Agriculture for use "in stables and kennels") was without effect on a small infection of dust with gravis bacilli on two other ward floors. The antiseptic was applied with a mop which was "rubbed out" to near dryness on the floor. Incidentally such antiseptics are recommended for use in concentrations of 1 in 400 for washing floors. In one ward a moderate infection was eliminated and in another almost eliminated by swabbing with 5% of this antiseptic.

TABLE VI—EFFECTIVENESS OF DISINFECTION METHODS

Ward	Diphtheria bacilli in dust	
	Before "stoving"	After "stoving"
N. M2	Few G	Few G
N. F2	Moderate no. G	Moderate no. G
Shelter	Few G	None
Cubicle	Moderate no. G	Few G
Margins	Not examined	Numerous G, few I
Shelter	,, ,,	Numerous G
L2	Numerous G	Numerous G

DISCUSSION

Anything learned about cross-infection in hospital wards, with diphtheria as the special case, should have a direct bearing on the understanding and the prevention of the spread of respiratory infections in general. In the past, attention has been riveted on droplet spread, and one has tended to think of this as direct dissemination of infection by means of small droplets through the air from donor to recipient. The work of Wells (1934) has produced some refinement of this conception, for he distinguishes between droplets of 0·1 mm. or more in diameter, which fall to the ground before they evaporate, and those of smaller size which, evaporating rapidly to form droplet nuclei, may remain suspended in the air for long periods. To these nuclei he attributes an important part in the spread of respiratory infection. If they are of great importance, prevention becomes a question largely of masking and aerial disinfection. But Hare (1940) supports the view that such nuclei are of relatively little importance in streptococcal infections and that it is the larger droplets and the infected milieu round the patient that need most attention. Cruickshank (1935) has long stressed the importance of air-borne infection, but the way in which the air becomes infected and the relative importance of the various possible methods are by no means decided.

Our own work on diphtheria (Wright et al. 1941) has indicated that close contact between patients is an important source of cross-infection, but it also suggests that such procedures as bed isolation while they reduce

do not eliminate this trouble. The work reported in this paper seems to emphasise still further our previous suggestion that floor dust is often heavily infected with diphtheria bacilli in the neighbourhood of diphtheria patients. White (1936) has shown that the same is true of streptococci, and her work has been confirmed by Hare (1941) and Thomas (1941). Moreover, the diphtheria organisms may persist and remain virulent there for long periods; they may rise with the dust into the air in large numbers, doubtless may pass to and infect patients, and might well be propelled in the dust for some distance. Before the part played by direct aerial transmission can be determined this indirect transmission must be eliminated. Treatment and disinfection of floors have been shown to reduce and often to eliminate it; but another source of air contamination is to be found in the bedclothes. Direct and indirect transmission are not mutually exclusive; the only question is as to the relative importance of each, and this may undoubtedly differ in different circumstances. In our experience indirect transmission, through dust to the air, appears to be predominant but evidence is still incomplete.

Disinfection of rooms has tended of recent years to be a ritual handed down to us from the past, with little to recommend it save its antiquity. Much that is done in the name of disinfection is in fact ineffective; like other routine procedures it needs checking from time to time. Where disinfection is needed it will be necessary to think much of the floor and other exposed surfaces and less of the air, and to use a method which will effectively dispose of a relatively concentrated and persistent focus of infection in the dust. There should probably be some use of antiseptic solutions on the floors themselves. The treatment of floors with spindle oil (paraffin) is effective in reducing air-contamination from dust, but the best method of application has still to be determined. As far as our observations go, important preliminaries are cleaning and, if possible, disinfection. The oil itself is, of course, not destructive to bacteria. A great help would be an antiseptic with the physical properties of spindle oil, which would, as it were, hold the bacteria to itself and in holding destroy them.

SUMMARY

Diphtheria bacilli can be isolated in large numbers and in virulent condition from floor dust in the neighbourhood of diphtheria patients. They may persist fully virulent in such dust for at least 14 weeks in vitro and 5 weeks on the floor.

Disturbance of such dust permits the diphtheria bacilli to rise into the air. Treatment of the floors with spindle oil reduces, and may entirely eliminate, air-contamination from this source.

Current disinfection procedures commonly fail to destroy the diphtheria bacilli in floor dust; for this purpose relatively strong antiseptic solutions appear to be necessary.

Dust probably plays an important part in the aerial dissemination of respiratory infections.

We wish to thank Mr. J. R. Tucker and Mr. A. C. Dawkins for technical assistance in our observations and experiments, and the various medical officers who have helped us to obtain material for examination.

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"... the heights reached by Science at the University of Oxford are such that it is difficult, if not impossible, to emphasise any particular one. I can only repeat with the Angel of the Apocalypse: 'Vidi turbam magnam quam dinumerare nemo poterat.'"—Dr. MARIANO CASTEX (professor of clinical medicine) in a speech acknowledging the conferment on him of the honorary degree of D.Sc. by delegates of the chancellor of the University of Oxford in Buenos Aires on Sept. 6.

MEASUREMENT OF THE HEART IN ANGULAR DEGREES

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IN spite of its limitations, the position of the apex-beat is still our best clinical guide to the size of the heart and a good indicator of its distress, inadequacy or overloading. It is hoped that the following simple method will make it still more valuable, by correlating the size of the heart with that of its owner.

The leftward palpable border as a rule agrees nearly enough with the X-ray shadow, but it may be different, especially in enlarged hearts. Consequently the apex-beat has ceased to be relied on by those who use radiology. Here there seems to be some confusion of thought, due to the old belief that the apex-beat did really indicate the heart size. Although this is now known to be often erroneous, the clinician can nevertheless obtain useful information as to cardiac distress from the character and location of the apex-beat, as well as from an accurate measure of its size by X rays. For instance, in effort syndrome, the displacement of the apex-beat reveals an abnormal cardiac action when the X rays show nothing abnormal. Moreover, teleradiograms or orthodiagrams can seldom be repeated often enough to guide treatment of an enlarged heart. All the clinician has to do is to substitute apparent size for actual size when he takes apex-beat measurements, and this I shall do throughout this paper.

THE HEART ANGLE

The three main drawbacks to the use of apex-beat measurements are: (1) that in children growth soon makes them out of date and valueless; (2) that they do not relate the size of the heart and of its owner; (3) that they provide no normal value applicable to patients of all sizes—the customary normal figure of 3½ in. is useless. To get over these drawbacks, we may take advantage of the convenient fact that the apex-beat (actually the cardiac impulse) moves, as the heart enlarges, like the end of a clock hand, round an arc of a circle formed by the chest wall (fig. 1). Let us take the mid-sternal line as 0° on this semicircle and the mid-axilla as 90°. Suppose the chest girth is 32 in., then the mid-axilla is 8 in. from the midline, and if the apex-beat is 4 in. from the midline it will be on the 45° mark on our circle. I call this the "heart angle" of that patient. This device removes the three drawbacks of the apex-beat, which now relates the size of the heart and its owner, making all hearts comparable; applies equally to growing children and adults; and provides a standard value for normal healthy hearts of any age. I find this heart angle averages about 38°. When our measurements involve fractions such as 3⅜/8¼ in. it is not so simple; hence I have devised a calculator chart (suitable for pocket, bag or desk) which does the needful arithmetic (fig. 2). If the calculator* is not to hand, the angle can be found later, provided you have recorded both the apex-beat and the chest girth.

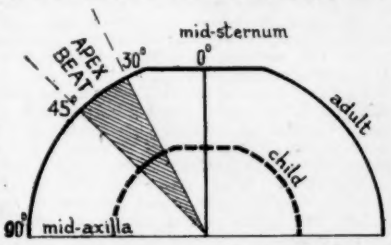

FIG. 1.—Diagrammatic cross-section through front half of the chest in a child and an adult, showing normal range of apex-beat in both (shaded area).

My procedure is to have the patient sitting or standing if possible. I prefer to be on his right so that my right finger-tips can curve round his ribs to locate the *leftmost palpable border* of the heart. This point and the midline are marked by two dots with the pen. If the casing of the tape measure is passed counter-clockwise the apex-beat and the chest girth can be measured in one operation.

* Obtainable from H. K. Lewis and Co., 136, Gower Street, W.C.1.

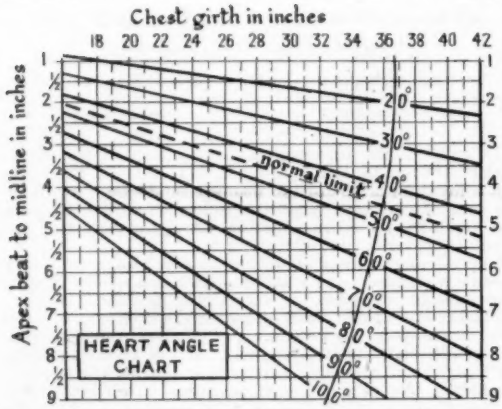

FIG. 2.—Chart to calculate heart angles. Find on the chart the intersection of the chest-girth and apex-beat measurements. That point will be on or near a ray which denotes the heart angle. Intermediate angles can be more easily estimated on the full-sized chart.

Occasionally, especially in aortic regurgitation, the apex is found in the sixth or seventh space instead of the usual fifth. Hitherto I have ignored this downward enlargement, as it occurs in only about 2% of healthy adults, but in special cases it can be measured by the simple device of putting the midline ink mark at the level of the fifth space and the other ink mark over the actual apex-beat. The sloping line joining them will be longer than the usual horizontal line and thus increase the heart angle so as to include this downward enlargement in the record. Sometimes the patient has to lean horizontally forward or take exercise to make the apex-beat palpable. In fat women, where the breast may have to be lifted to feel the apex and measurements will have to be made below the breasts, care must be taken not to displace the marks on the skin.

In the enlarging heart X rays show a slightly broader silhouette, whereas the tape measure shows a much larger increment because the enlarging convexity of the heart is expanding towards a concavity in the chest wall, like a cart wheel making contact with a curved depression in the road. When palpation fails, I seldom find percussion of much help, but I percuss for high-tension gas below the heart which might be pushing it up and perhaps out.

MEASUREMENTS IN HEALTH

First-class lives.—At the outset it was necessary to find the normal limits of the heart angle in adults and children. The Scottish Life Insurance Society, which rightly insists on the apex-beat being measured, kindly sent me the records of 250 first-class lives examined by

Type of patient	Heart angles in degrees							Average (degrees)
Short and fat ..	32	37	28	37	33	32	..	34·3
	40	31	37	36	37	33	..	
Tall and thin ..	38	44	31	35	33	35	..	36·5
Tall and fat ..	42	32	33	40	..	..	..	37
Short and thin ..	40	45	34	38	36	30	35	37
Fat	34	31	34	35	34	32	29	34·5
	42	35	34	37	37	..	..	
Tall	27	33	37	32	35	34	30	34
	35	41	..	..	..	..	..	

doctors all over this country in 1936. All but 30 of these were included between 30° and 40°, which seems the usual limit (range 27° to 44°). Next it was necessary to verify that the chest-girth factor did compensate for the size of the owner of the heart, as assumed in the heart-angle formula. Hence I extracted from these statistics the heart angles of all those who departed conspicuously from the normal in build.

There seems here no indication that extremes of build cause any constant deviation of the heart angle. This conclusion is supported by comparing a giant with a little man, both healthy. The giant has height 6 ft. 5½ in., weight 15 st., chest 38 in., apex-beat 3·5 in. from midline, heart angle 33°. The little man has height 5 ft. 6 in., weight 8 st. 5 lb., chest 31 in., apex-beat 2·75 in. from midline, heart angle 32°. Hence, although their apex-beats differed by 20%, the chest-girth factor succeeded in awarding the giant and the little man the same heart angle. Formerly, in life-insurance work, one had almost to guess whether the heart was too large for its owner. Henceforth we have a defined standard, so that any heart angle exceeding 45° must be scrutinised.

Healthy children.—Dr. Helen Moffat, assistant school medical officer for the East Riding, kindly measured the heart angle in 86 girls of school age, and found the average to be 34° and the range 30–40°, as in the insured men. She also measured the angle in 64 girls and boys of school age and found no difference in the two sexes; the average in this series was 38° and the range 34–41°. Infants' heart angles have a rather higher range than the usual 30–40°. Evidently the heart angle will be more valuable than the position of the apex-beat in the routine examination of school-children, both for detecting hearts which are too large and for giving a figure which should remain constant in spite of the child's growth.

Naval ratings.—Dr. Eric Lewis kindly measured the heart angle in 200 healthy naval ratings at sea under his care. Aided by the calculator, he found it little more trouble to measure the heart angle than to measure the apex-beat in the ordinary way. The frequency curve shown in fig. 3 made from his figures confirms my previous

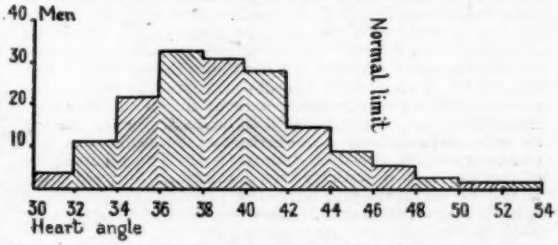

FIG. 3.—Frequency curve of heart angles of 198 healthy naval ratings.

normal limits of 30–40°. Only 5% exceeded 45°; of these ten men, one (48°) was suspected of thyroid over-activity and two (52° and 54°) had each had rheumatic fever twice. If their heart angles had been measured as recruits they would presumably not have been admitted to the Navy. These 200 heart angles will be more reliable than my 250 first-class insurance cases because they were all measured by a single careful physician while the men were at work.

Labourers.—I examined 50 men and 20 lads between sixteen and twenty for admission to a factory. They were an uneven sample of the labour market. The 20 lads averaged 41·5°, the men 42·6°. This bears out my suspicion that labouring work increases the heart angle, as the naval men had averaged 39°. Two long-distance runners in this group had heart angles of 48° and 51°. In one man the nipple and heart angle were both at 54°. In only one man was the heart apex-beat impalpable.

CARDIOTHORACIC RATIO AND HEART ANGLE

A teleradiogram should show not only the size of the heart but also the relative widths of the heart and the thorax. This is called the cardiothoracic ratio and it relates the width of the heart to the width of the thorax. The average cardiothoracic ratio for men is given as 0·48. This corresponds to a heart-angle of $0{\cdot}48 \times 90 = 43°$, some 4° higher than the average angle in my figures. But the heart angle has the great advantage that depth and width of the chest and apex-beat are measured instead of mere width as in the X-ray method. Presumably, deep-chested and shallow-chested people may give different X-ray ratios even if their hearts are normal, and the heart angle is therefore in some respects more useful than the cardiothoracic ratio, as well as being simpler, cheaper, and easier to estimate.

ABNORMAL HEART ANGLES

Temporary variations in heart angle are common. Thus in my own ambulant or hospital (non-cardiac)

cases the angle is often over 40° and may reach 50°, probably from lack of tone. In cardiac patients I do not worry about enlargement if the angle is less than 45°. Variations of the heart angle in ill health are illustrated by the following cases.

CASE 1.—An anxious, timid man, aged 30, had six months of nocturnal cardiac pain. The heaving, diffuse apex-beat showed a heart angle of 65° when standing but only 52° when lying down. The sounds were normal, and the teleradiogram report was "normal, no enlargement." Yet on his next visit seven years later the heart angle had improved to 50°. Here the heart angle measured an abnormality which the X rays did not detect, and their disagreement proved a cardiac neurosis.

CASE 2.—Another civilian effort syndrome patient, aged 25, had a pulse-rate of 140 and heart angle of 58°, with a former history of left pleuritic effusion and frequent colds. After two months of mainly psychological treatment, the pulse had dropped to 84 and the heart angle to 46°. His cardiothoracic

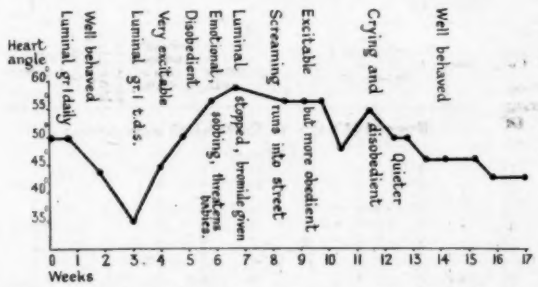

FIG. 4.—Heart angles in a boy of 9 years with chorea, showing increase in the angle under emotional stress. No bruit was audible throughout.

ratio before and after his cure was normal (0·44). The discrepancy between these figures (44 ratio and 58°) confirms the diagnosis of effort syndrome, for after his cure the two figures approximated, as normally, to 44 ratio and 46°. But much more work is needed on these lines.

CASE 3.—A chronic epileptic aged 41. Very healthy and works two allotments. In 1937 her heart angle was 40°, pulse-rate 140, soon quieting to 80. In 1940 the heart angle was 54°, pulse-rate 90. In 1941 she had a fit in my rooms lasting seven minutes, after which her pulse-rate was 100 (hard) and heart angle 68° (diffuse). The angle was normal (47°) seven weeks later. This case illustrates how the beats of a briefly agitated heart may be widely palpable through the overlying lung, and may thus explain the simulated enlargement of the agitated heart in effort syndrome.

CASE 4.—A boy of 9 had an angle of 47° after six weeks of chorea. A mild otitis increased it to 58°, but it returned to 45° in nineteen days. This demonstrates that a passing infection may produce a transient increase in the heart angle.

CASE 5.—An elderly diabetic with high blood-pressure (200 mm.) had a heart angle of 56° during coma which fell to 35° soon afterwards.

CASE 6.—A boy of 9 with chorea and an explosive temper had an emotional storm in which his heart angle rose to 57°—a figure not increased when he escaped from the ward and ran 200 yards at top speed. His heart angle was charted during seventeen weeks and indicated excitement rather than chorea as the factor causing enlargement (fig. 4). Emotional storms in several children with chorea had a remarkable effect in increasing the heart angle.

CASE 7.—If one has old records of the apex-beat of patients whose chest girth has remained constant one can measure their chest girth of today and thus reconstruct their changing heart angles of past years. A thin elderly diabetic in 1920 had a heart angle (reconstructed) of 55°, improving after seven years of insulin to 47° in 1930. This slowly increased by 1937 to 75° with heart pains on exertion, and to 87° in 1939 when his legs swelled and he died—illustrating how circulatory decay rather than hyperglycæmia kills elderly diabetics nowadays.

CASE 8.—A man of 59 had tobacco angina in 1927 with a heart angle of 62°. He stopped smoking and his angina vanished till 1938 when he had real anginal attacks, but a normal angle of 43°. He died suddenly, aged 70, and the autopsy showed a small thin-walled heart with calcified coronaries. Compensatory enlargement could not occur with obstructed blood-supply.

CASE 9.—A girl of 17 who had rheumatic fever and mitral regurgitation died ten years later with a heart angle which slowly increased to 100° before death. A teleradiogram showed only half an inch of lung on each side of her enormous heart. At one period her angle of 90° improved to 68° after a short change of air and stayed at about 68° for eleven months. (In two other patients I have noticed this heart-toning effect of a change of air.) It was remarkable what compensatory hypertrophy enabled this plucky girl to do. Thus at 78° she enjoyed a week of gentle cycling and sailing and never felt so well.

SUMMARY

The position of the apex-beat remains our best clinical guide to the size of the heart and is a sensitive indicator of cardiac distress, inadequacy or overloading.

The chief drawbacks of the apex-beat to midline measurement are (1) that in growing children it soon becomes valueless; (2) that it makes no allowance for the patients' size; and (3) that it provides no normal applicable to all patients, children and adults.

It is proposed to measure the leftward size of the heart as an angle. The mid-sternal line is taken as 0° and the mid-axillary line as 90°. The position of the apex-beat is then expressed as a figure between these two. This "heart angle" is calculated by dividing the distance of the apex-beat from the midline by the chest girth and multiplying by 360°, or it can be read off on a simple chart.

The angle is not affected by growth, it relates heart size to chest size and allows a normal to be laid down.

The normal range of the heart angle in health has been found by measurements in 250 life-insurance candidates passed at ordinary rates, 200 naval ratings, 70 labourers, and 140 school-children. Both in children and adults it lies between 30° and 45°. Instances are given of abnormal heart angles in 9 cases.

The method of stating heart size is quick and easy, and should prove useful in life-insurance work, fever hospitals and the routine examinations of school-children, as well as for the physician and general practitioner.

I am grateful to Sir Thomas Lewis for helpful criticisms and to Dr. Maurice Campbell and Dr. C. G. K. Thomson for their help.

PROGNOSIS OF CONGENITAL PYLORIC STENOSIS TREATED WITH EUMYDRIN

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A GROUP of 40 cases of pyloric stenosis, 20 of which have been reported in a previous paper (Dobbs 1939) have been treated with Eumydrin.

On admission, each received enough parenteral fluid to relieve existing dehydration. Feeds were considerably reduced for the first few days and were preceded on the first day by an oral dose of 1 c.cm. of a 1 in 10,000 aqueous solution of eumydrin; on subsequent days the dose was gradually increased until 5, 6 or even 7 c.cm. was given before each feed. Each morning the stomach was washed out until the return was clear, and this was done until the morning residue was negligible. At the end of the first week or ten days the progress of the case was reviewed and a choice made between further medical treatment or operation. If there had been no decisive improvement in the vomiting or the child's general condition, the effects of further medical treatment, or, as Lightwood (1940) has suggested, larger doses of eumydrin were not tried; symptoms were relieved by prompt operation. Infants responding to medical treatment were discharged to attend outpatients as soon as vomiting was sufficiently controlled, provided that the mothers were capable of treating them at home.

From the results it appears that cases of pyloric stenosis, at first indistinguishable one from the other,

respond differently to treatment with eumydrin. By discharging each child as soon as it was safe to treat him as an outpatient, and by operating at the end of a definite period if he did not improve, the differing response was emphasised—even over-emphasised—and it has been possible to tabulate the cases according to their length of stay in hospital, or, on the other hand, to class them as medical failures. On this basis the cases have been analysed to ascertain whether there is any indication of a relationship between presenting ætiological factors and response to treatment.

RESULTS

Of 40 cases treated over three years, 33 cases (4 out of 5) were male; 28 were firstborn children, 9 were second born and the remaining 3 were third born; 2 of the firstborn children were one of twins; a first cousin of another child had recently died of pyloric stenosis. The average age at onset of vomiting was 3½ weeks; 25 cases were wholly breast-fed at the time of admission; 2 partially breast-fed, and only 5 artificially fed. The group of cases, therefore, has those features of age and sex-incidence, position in family, interval of good health and successful breast-feeding before the onset of vomiting which have always been striking in this disease.

In all, 27 children were cured with medical treatment (table I) and 8 by operation; 1 (case 14) died during medical treatment, and 4 after surgical treatment. Of the cases cured medically, 3 were treated from the outset as outpatients; 20 were discharged within three weeks of admission, the remaining 4 being in hospital for over four weeks; 2 cases successfully treated medically had to be readmitted during the course of treatment.

CASES CURED MEDICALLY

In table I the 27 cases cured medically have been rearranged in the order of their length of stay, and subdivided into group A (discharged within ten days), group B (discharged within twenty days) and group C (discharged after more than twenty days). Case 5 in group A (because the mother developed pneumonia) and case 17 in group B (because of a transient diarrhœa) were readmitted for further treatment. These 2 cases have been classified according to the length of their first stay in hospital because the reason for their second admission was other than a return of the vomiting.

The division of the cases into those discharged before, and those after, ten days is made in order that the cases responding to medical treatment almost immediately may be contrasted with those in which response was slower. The 4 cases in group C have been separated from those in group B because they remained in hospital so long (over thirty days) and because in 3 of them (cases 1, 6 and 21) the cause of the long stay was other than the persistence of vomiting.

CASE 1 contracted mild diarrhœa.

CASE 6 was retained long after cure because of home conditions.

CASE 21 responded so soon that eumydrin was omitted much too early, with consequent return of symptoms; treatment with eumydrin was begun again, and this prolonged his time in hospital.

CASE 29 only was kept in because of slow response to medical treatment. The symptoms abated gradually and he was discharged after 4½ weeks of treatment.

OPERATIONS

In 12 cases (group D) surgery became necessary and Rammstedt's operation was performed; 8 made good recoveries and 4 died (table II). All except 3 (cases 7, 27 and 36) were operated on within two weeks; these 3 had relapsed after the vomiting had apparently been controlled.

CASE 7 did well in hospital and while breast-fed, but relapsed at home when the mother ceased breast-feeding him. After readmission, vomiting was poorly controlled; and it was soon decided that operation was advisable.

CASE 27 was treated medically, in hospital and at home, for over four months. Vomiting, though never sufficient to prevent a gradual weight increase, was never absent during this time, and peristalsis was persistently seen and a tumour occasionally felt at his visits to outpatients. When operation was eventually undertaken a very large and hard tumour was found.

CASE 36 was discharged on the 6th day, having apparently responded well to treatment. In outpatients there was occasional vomiting which was severe enough to necessitate readmission two weeks later. Treatment was begun again and up to 5 c.cm. of eumydrin given, but after two more weeks it was decided to operate. Recovery was immediate and uneventful, and the child was discharged six days later.

DEATHS

Of the series of 40 cases 5 died; case 14 after 11 days of medical treatment, and the remaining 4 after medical treatment had been suspended and operation had been performed. Case 14 has not been included in table I; it has been reported fully elsewhere (Dobbs 1939), and it was concluded that the child died of the effect of several successive large doses of eumydrin given at a time when he was dehydrated. Toxic symptoms were otherwise uncommon, though one or two children showed transient flushing and excitement.

CASE 23 was operated on and the duodenal mucosa was penetrated. The child developed purulent peritonitis (confirmed at autopsy) and died 24 hours later.

CASE 35 failed to respond to medical treatment and was operated on thirteen days after admission. The operation was successful, but the infant vomited under the anæsthetic. When he came round he was found to have massive pulmonary collapse, from which he died three days later. At autopsy milk curds were found impacted in the right bronchus, and the right lung was collapsed and œdematous. The operation site was satisfactory.

The condition of these 2 children at operation was considered to be good, and their deaths represent the operative mortality—that is to say, they succumbed to risks of operation which are present whether there has been previous medical treatment or not. Cases 37 and 38 died of gastro-enteritis and are discussed in the next section; they represent the postoperative mortality.

TABLE I—DETAILS OF 27 CASES SUCCESSFULLY TREATED BY EUMYDRIN, ARRANGED ACCORDING TO LENGTH OF STAY IN HOSPITAL

Case	Sex	Place in family	Days in hosp.	Age at onset	Age on admission	Weight change since birth	Max. dose eumydrin at each feed	Weeks given
				(wks.)	(wks.)	lb. oz.	(c.cm.)	
Group A (13 *cases*). In hospital 10 days or less								
24	M	1	0	4	12	+ 1	2·5	6
26	F	1	0	8	10	+ 2 9	3	8
39	M	2	0	6	9	+ 1 2	4	6
33	M	1	5	7	8	+ 1	3	9
34	M	1	5	6	7	+ 9	3	10
12	M	1	6	6	8	+ 1 2	5	7
15	M	2	6	4	7	+ 5	4	11
4	F	1	7	2	4	− 6	2	9
40	M	3	7	5	6	+ 1 4	2	..
28	M	1	8	1	1½	+ 4	3	6
5	M	2	9	6	8	+ 1 4	4	9
18	M	1	9	4	5	+ 3	5	15
31	M	1	10	5	6	+ 1 2	3	10
Average		..		5	7	+ 14	3	8
Group B (10 *cases*). In hospital 11–20 days								
9	M	2	13	2½	4½	− 8	4	8
11	F	1	13	3	6	− 5	6	10
2	M	2	14	2½	5	− 5	2·5	10
13	M	1	14	5	7½	±	3	9
32	F	3	14	2½	5	− 2	5	8
10	M	1	15	2½	4½	− 3	4	11
16	F	1	15	2	3	− 1 14	6	11
17	M	3	15	2½	3	+ 2	4	12
18	M	1	18	3	4	+ 1 3	5	11
19	M	1	19	3½	4	±	4·5	14
Average		..		2½	4½	− 7½	5	10½
Group C (4 *cases*). In hospital over 30 days								
21	M	2	30	3	7	+ 1 1	..	12
29	M	1	32	8	9	+ 2 13	..	12
1	F	1	34	½	3	− 1	..	13
6	F	1	70	3	6	− 1 2	..	9

TABLE II—DETAILS OF 12 CASES (ALL MALE) OPERATED UPON AFTER EUMYDRIN HAD FAILED

Case	Place in family	Age at onset (weeks)	Length of history (days)	Birth weight	Weight on admission	Weight at operation	Max. dose of eumydrin at each feed (c.cm.)	Length of treatment (days)	Reason for operation	Result
				lb. oz.	lb. oz.	lb. oz.				
7	1	3	7	7 4	7 10	7 12	6	27	Relapse	Disch. 12 days
8	2	2	7	8 0	7 6	7 6	5	10	Contd. vom.	Disch. 7 wks.
20	1	1	1½	8 12	7 6	6 12	7	8	Contd. vom., loss of wt.	Disch. 8 days
22	1	4	14	6 8	6 11	7 1	4	8	Contd. vom.	Disch. 3 wks.
23	1	3½	14	8	8 3	8 6	5	8	Contd. vom.	Death (peritonitis)
25	1	3	14	7	8 5	8 6	5	10	Contd. vom.	Disch. 7 days
27	1	1½	2½	6 6	5 15	8 3	6	105	Relapse	Disch. recov. 12 days
30	1	4	..	8	8 12	8 2	4	6	Contd vom., loss of wt.	Disch. 2 wks.
35	1	½	17	7 5	6 11	6 15	7	13	Contd. vom.	Death (pulm. collapse)
36	2	3	17	6	6 10	7 3	5	33	Relapse after disch.	Disch. 7 days
37	1	1½	24	6 13	6 15½	6 8	4	12	Contd. vom.	Death (gastro-ent.)
38	1	4	21	7 12	7 4	..	5	5	Contd. vom.	Death (gastro-ent.)

INFECTION

The only serious infection that occurred in these cases was gastro-enteritis. One child discharged on eumydrin was readmitted after developing loose stools at home. There was, however, no fever or loss either of weight or well-being, and the condition scarcely warranted the label of gastro-enteritis. Case 1, and probably case 38, were admitted with gastro-enteritis, and 2 children (cases 21 and 37) developed it while in hospital.

CASE 1 was admitted aged 3 weeks, weighing 5 lb. His condition was poor and he had frequent loose motions. Eumydrin was tried tentatively because the risk of surgery was considered to be too great. Vomiting ceased within five days of treatment and the gastro-enteritis gradually improved; he was discharged on the 34th day.

CASE 21, aged 7 weeks, was treated with eumydrin and developed slight pyrexia and diarrhœa a week after admission. The condition was transient and was sufficiently improved for him to be discharged thirty days after admission.

CASE 37 failed to respond to medical treatment and Rammstedt's operation was performed on the 13th day. Gastro-enteritis set in a week later and he died fifteen days after operation.

CASE 38 was first seen at five weeks, but the mother refused admission. Medical treatment was started two weeks later; it was given only long enough to improve the chances under surgery, and Rammstedt's operation was performed five weeks after admission. After operation gastro-enteritis set in from which he succumbed eleven days later.

DISCUSSION

It is clear from these results that medical treatment with eumydrin will relieve the symptoms of pyloric stenosis in a large number of cases. Tables I and II show that over a third (group A) of the cases responded almost immediately and were out of hospital within ten days, and many of them much sooner. Another third (group B) had begun to respond towards the end of the first week, and these were out of hospital within three weeks. The last third (group D) failed to respond within the stipulated time and were operated on.

Two questions present themselves.

First, is therapeutic trial the only criterion or are there any features which will differentiate cases that are going to respond easily from those that will need operation? Secondly, would longer medical treatment lead to a greater number of successes, and if so would it be justifiable to keep these infants longer in hospital?

At the first clinical examination there did not appear to be any clinical or ætiological factors on which to base a prognosis for medical treatment. On several occasions the vigour of the peristalsis, or the size and firmness of the tumour, was commented on, and yet the response to treatment was satisfactory; on the other hand, some cases who eventually needed operation had, on first examination, no palpable tumour and only indefinite peristalsis, and were doubtfully diagnosed as suffering from pyloric stenosis.

The ætiological factors and the symptoms as they appear in tables I and II are summarised in table III (omitting group C). From this analysis there emerge one or two significant points. In the first place, the 13 infants of group A who responded rapidly, were almost exclusively those who were four weeks old or over when vomiting began (11 out of 13 cases) and who had increased in weight since birth (12 out of 13 cases). Indeed, only 2 other cases in the series of 40 were over four weeks old when their symptoms began. The average age for group A at the onset of symptoms is five weeks, at the time of admission seven weeks, and they had on an average increased 14 oz. since birth. These salient points are emphasised by the corresponding figures for the 3 cases who did not need admission; the average age of these was six weeks at onset and ten weeks at first examination, and they had all put on over 1 lb. since birth. These figures contrast sharply with those for the 2 other groups—group B who responded more slowly and group D who were operated on. In both these latter groups the average age at onset was less than three weeks and on admission was only 4½ weeks; and they had on the whole either not gained or had actually lost weight. In group D not one child developed symptoms later than the fourth week of life. Two other points may be noted

TABLE III—CASE-HISTORIES COMPARED

—	Av. age at onset (wks.)	Av. age on admission (wks.)	Av. weight loss or gain since birth (oz.)
Group A (disch. within 10 days)	5	7	+ 14
Group B (disch. within 20 days)	2½	4½	− 7½
Group D (treated by operation)	2½	4½	+ ½

about the infants in group D: all were males—and 10 of the 12 were firstborn; whereas of the 27 medically treated cases (groups A, B and C) 7 were female and only 17 firstborn.

From the few cases in this series it appears that the children whose symptoms begin comparatively late may be expected to respond rapidly and can probably be safely treated as outpatients; and also that a better response is probable with a female than with a male child. About two-thirds of all the cases, however, do not fall in this group; yet about half of these responded rapidly enough to be discharged within two or three weeks. Radiology gave no help; it was found that the delay in the emptying time of the stomach bore no relation to the results of treatment—a finding in agreement with that of Findlay (1938).

It is hard to say whether longer medical treatment would have led to a greater number of successes, because operation was performed empirically at the end of ten to twelve days; but it has already been noted that in case 29 treatment was continued and a response obtained after the third week.

Working with both atropine and eumydrin, Svensgaard (1935) and Wallgren (1940) found that almost all their cases eventually responded though in some treatment had to be

continued for several weeks; Mackay (1941) also finally got a good response in 35 of her 40 cases. On the other hand, in 2 of the present series medical treatment was prolonged (in case 36 for 33 days and case 27 for 3½ months), and yet in both operation was eventually necessary and in both firm tumours were found. It would seem, therefore, that though most cases will respond to medical treatment with eumydrin comparatively rapidly, a few will not do so without several weeks of careful inpatient treatment, and occasional ones will eventually need operation.

Is the increased stay in hospital, which lengthy medical treatment entails, justified? There has been a gradual improvement in the surgical results, and a few series have been published (Levi 1936, Harris and Keynes 1937) in which the mortality has been less than 5%. These results are, however, those of experienced surgeons working under ideal conditions, and there is no question that the usual figure even in reported series is considerably higher. The mortality, for instance, in cases admitted to Great Ormond Street Hospital during 1924-30 was consistently 25% or over (Paterson 1931), and it is probable that the average figure up and down the country is even higher. The factor of most importance in the mortality is the high incidence of infection, especially gastro-enteritis, following operation. Cases operated on in private have always had a much lower mortality than hospital cases. There were no deaths in Paterson's series of 50 cases operated on in nursing homes by the same surgeons, and cared for by the same physicians, as the cases admitted to Great Ormond Street Hospital. Equally good results have been obtained in the hospital class of patient operated on under nursing conditions approaching those found in private (Levi 1936).

As regards this series it is possible to argue that the deaths of cases 37 and 38 could have been avoided by immediate operation and early discharge, but it must be borne in mind that of the 4 cases of gastro-enteritis, 2 (one of whom was admitted with the condition) were medically treated and recovered, and 2 (one of whom had also contracted the condition before admission) were operated on thirteen and five days after admission and died of the infection though the stenosis was relieved. The diagnosis and prognosis of gastro-enteritis of infancy is too variable to base any conclusions upon the results of 4 cases; but there is no evidence that operation improved the prognosis when gastro-enteritis was encountered. The alleged liability of pyloric infants to contract gastro-enteritis is to a certain extent the liability of infants who have been partially starved for a considerable period of time. It may also be that an abdominal operation followed by a period during which food intake is minimal likewise greatly increases the susceptibility of infants to contract an infection, and greatly decreases their resistance to it when contracted. It is possibly safer to treat medically even those cases admitted to open wards, rather than to expose children to the risks of contracting gastro-enteritis after a debilitating operation.

At present gastro-enteritis is the greatest menace to the infants with pyloric stenosis admitted to English hospitals. So common is it that these infants have been credited with a constitutional susceptibility to gastro-enteritis, but the facts should reflect less on the child's constitution than on the nursing conditions obtaining in our hospitals. And though it is true that skilled surgeons operating on large numbers of hypertropic pyloruses can get good results, yet the effects of surgical intervention continue to appear as a cause of fatalities in the reported cases and are certainly responsible for an appreciable percentage of the deaths from pyloric stenosis.

SUMMARY

A series of 40 cases of congenital hypertrophic pyloric stenosis were treated with eumydrin; if response was unsatisfactory within ten days they were operated on.

The cases fall into four groups: Group A (13 cases) were discharged within ten days; the patients were all four weeks old or more before vomiting started, and all but one had gained over their birth weight on admission.

Group B (10 cases) showed some response within ten days and were discharged within three weeks of admission.

Group C (4 cases) discharged after thirty days; in 3 of these cases the prolonged stay in hospital was due to causes other than persistence of vomiting.

Group D (12 cases) had not responded within ten days and were operated on.

No ætiological factors or physical signs distinguished groups B and D from each other, but together they contrasted with the rapidly responding group A; the average ages of the cases in groups B and D, when vomiting started, were 2¾ and 2¾ weeks, and no child operated on was over four weeks old, there was no loss over the birth weight in most of the cases.

The findings suggest that those cases of pyloric stenosis who have not vomited until after the fourth week of life can be safely treated as outpatients and a rapid response may then be expected.

Most cases admitted to hospital will, sooner or later, respond to medical treatment. Since, for a few, medical treatment must be lengthy the relative risks of operation (direct surgical risk and risk of post-operative infection) have to be balanced against the risks of a possibly long stay in hospital. The risk of a long stay in hospital may, in the long run, prove to be more than counterbalanced by the adverse effects of operation on the resistance of these infants to infection.

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ALLERGIC REACTION TO LIVER EXTRACT

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ALLERGIC symptoms during a course of parenteral administration of liver extract are rare. Murphy (1933) states that he saw two reactions in the course of 1000 injections and both seem to have been trivial. Bray does not mention the condition, but Schlesinger (1930) has reported three cases, Jones (1939) two, and Engel (1933), Grun (1934), Krantz (1938), Lasch (1936) and others single cases. The case here recorded is of interest because the symptoms were severe and it was possible to effect desensitisation.

CASE-HISTORY

A woman of 47 was evacuated from London at the end of June and attended the outpatient department of the Royal Cornwall Infirmary on July 6. She had been having treatment for pernicious anæmia for eighteen months and a letter from the hospital which she had attended stated that her maintenance dose was 2 c.cm. of Examen fortnightly. Shortly after her injection in the middle of February she collapsed, but she soon recovered, apparently without treatment, and went home. She was persuaded to have a further injection on April 16, as the allergic nature of the symptoms of a month before was not recognised. This time the injection of examen produced a severe anaphylactic shock within a few minutes, with fainting, sweating, sickness and diarrhœa, and she became almost pulseless. She was given adrenaline and Coramine and was detained in hospital for one night.

When I saw her she had had no liver extract for three months and symptoms of anæmia were severe. She was short of breath and there was moderate œdema of the legs. The blood-count was as follows: hæmoglobin, 35%; red cells, 1·8 million per c.mm.; colour index, 1·0; mean diameter, 8·24 μ; white cells, 4800 per c.mm. (polymorphs 52%, lymphocytes 42%, monocytes 2%, eosinophils 2%, myelocytes 2%); marked anisocytosis, poikilocytosis, punctate basophilia and polychromasia.

DESENSITISATION

In view of the history, it was decided to take the patient into hospital and to use a different brand of liver extract. On July 12 I started hypodermic injections of Campolon, beginning with ℥ 1 and increasing the dose by a minim every half hour. When a dose of ℥ 3 had been reached she complained of itching of the skin and there was slight œdema of the hands and face. She was given ℥ 5 of adrenaline and no further injections that day. Next day, the symptoms having disappeared, we started again with ℥ 1 and worked up as

before, but this time with injections spaced at 2-hourly intervals. When the ℿ5 dose was reached the patient became obviously dyspnœic, her pulse was rapid and almost imperceptible and she had œdema of the face and hands with intense itching and discomfort.

It was then decided to attempt desensitisation with one injection daily, and this method was successful, the doses on successive days, beginning July 16, being campolon ℿ3, ℿ5, ℿ7, ℿ10, ℿ13, ℿ17, ℿ20, ℿ25, ℿ35. A daily dose of ℿ35 (2 c.cm.) was continued till the blood-count had reached normal. On July 27, immediately desensitisation had been completed, the blood-count was 2,560,000 per c.mm.; Hb. 50%; C.I. 1; white cells 4200 per c.mm. (polymorphs 73%, lymphocytes 20%, monocytes 6%, eosinophils 10%). She had to leave hospital sooner than I wished, but I saw her again on Jan. 4 when she was well and said that she had been having 2 c.cm. of campolon every fortnight since her discharge. There had been no recurrence of the allergic symptoms.

The following points emerge from a perusal of the literature:

1. The allergic state is usually established in a patient who has already had several injections of liver extract without ill effect.

2. The exciting factor appears to be the anti-anæmic principle itself and changing the brand of extract has not usually been successful. Allergic symptoms have been recorded after Examen, Campolon and Pernæmon.

3. A complaint of dyspnœa, faintness or transient urticaria occurring soon after an injection of liver extract is an indication for caution in the administration of the next dose. A preliminary skin-test will help to decide whether the patient has become hypersensitive.

4. Desensitisation may be effected in some cases and it is usually advisable to start with skin-test doses.

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BULBAR PALSY DUE TO AN ATHEROMATOUS VESSEL

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REGISTRAR TO ST. THOMAS'S HOSPITAL

DISORDERS of cranial nerves due to pressure of atheromatous vessels have been described in connexion with the optic and abducens nerves, but we can find no record of a similar condition affecting the medulla. The following case is an example.

A man aged 65 was admitted to hospital on Jan. 15 with 8 months' history of dysphagia and hoarseness. His previous health had been good, with the exception of an attack described as a "slight stroke" 18 months before admission; from this he had recovered completely in a few days. He was a wizened man with a mild degree of senile mental change. His voice was a hoarse whisper and attempts at swallowing produced much spluttering and coughing. His upper cranial nerves were normal, but his palate rose to the right on phonation, his left vocal cord was fixed, and the left half of his tongue was atrophic and deeply furrowed. The remainder of his nervous system showed no defect, tendon reflexes being present and equal and plantar responses flexor. His brachial and temporal arteries were hard and tortuous and similar changes were seen in his fundi. His blood-pressure was 210/100 mm. Hg and there was a loud to-and-fro murmur over the aortic area. There was a chronic dislocation of the right shoulder. The Wassermann reaction was negative in the blood and cerebrospinal fluid; the latter showed protein 45 mg. per 100 c.cm., no excess globulin and 6 cells per c.mm. On Jan. 30 he gradually lapsed into coma and developed signs of bronchopneumonia, from which he died.

Autopsy.—Severe atheroma was found in all the arteries of the body. All three aortic cusps were calcified. There was a recent area of cerebral softening in the left parietal region and bronchopneumonia at both lung bases. The left vertebral artery was the seat of a fusiform atheromatous dilatation 5 mm. in diameter, extending for the length of the medulla. All the nerve-roots, medial and lateral, arising from the medulla on this side had disappeared. Sections of the medulla showed no internal abnormality, microscopic or macroscopic. There was no tract degeneration and no area of softening or gliosis. We therefore conclude that the atrophy of the nerve-roots, and the consequent paralyses were the direct result of pressure from the atheromatous artery.

Our thanks are due to Dr. Heward Bell for permission to publish this case, to Dr. J. St. C. Elkington for his advice, and to Dr. Serge Keys for the post-mortem findings.

MENINGITIS DUE TO SALMONELLA LONDON

BY

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THE following case of meningitis is recorded because an unusual type of infecting organism was isolated from the cerebrospinal fluid.

A warehouseman of 61 was admitted to St. Giles' Hospital on Aug. 19, 1940. He had suffered from spastic paralysis of the legs for twenty years, for which he had attended the National Hospital, Queen Square. His chief complaints had been weakness, pain in the back and severe constipation. His left leg was weaker than his right and he could not walk unaided. Four days before admission he woke up at night sweating profusely. He continued at work the next day but on the third day took to his bed with pains in the legs, vomiting, restlessness and inability to pass water. Examination showed considerable wasting and dorsolumbar kyphosis. He was comatose and made spasmodic movements of the arms and legs. His temperature was 101° F. and pulse-rate 92. Extreme bilateral atrophy of the quadriceps and hamstrings was present. On the left side the plantar response was flexor but on the right extensor. The muscles of the arm showed fair tonus and tendon reflexes were present and equal. The pupils reacted to light and accommodation. He had a right supranuclear facial paresis. The urine had to be withdrawn by catheter.

On lumbar puncture a very turbid yellow spinal fluid was obtained but the pressure was not increased. The result of the examination of the fluid is shown below. Treatment was begun with 2 g. of M. & B. 693 Soluble intramuscularly every four hours. On the seventh day of his illness the patient was better and he was able to take sulphapyridine by mouth. For a time he became more conscious and could respond to those around him in some degree, but on the twelfth day hypostatic pneumonia was detected. The patient became moribund and died on the sixteenth day of his illness.

Laboratory findings.—Cerebrospinal fluid withdrawn soon after admission showed: white cells, 4500 per c.mm.; polymorphs 89%, lymphocytes 9%, endothelial 2%; red cells + +. Short gram-negative bacilli in films. Total protein 2200 mg. per 100 c.cm.; globulin (Pandy's test) positive; sugar decreased; Wassermann reaction negative.

Cultures gave a growth of an organism of the salmonella group which was agglutinated by the patient's serum in a dilution of 1 in 320 and was later identified by Dr. W. M. Scott of the Ministry of Health as being type "London." A similar organism was isolated from three later specimens of the cerebrospinal fluid although the last specimen (obtained on the tenth day) was almost clear. It was also isolated post mortem from the gall-bladder, ileum and meninges but not from the colon, spleen, liver or heart blood.

A specimen of fæces could not be obtained during life. Urine showed a few pus cells and red cells. From it on culture a few colonies of enterococci and *Bacillus coli* were obtained.

Autopsy showed a chronic purulent meningitis mainly over the anterior half of the vertex. Middle ears healthy. Confluent bronchopneumonia of both lungs with bronchiectasis in left lower lobe. Right ventricle dilated and muscle soft. Severe atheroma of aorta. In the stomach there was a depressed spider scar of an old ulcer and mucous catarrh. The intestines showed slight œdema, congestion and mucous catarrh but no ulceration. A few false diverticula were present.

Histological examinations of post-mortem tissues made by Dr. A. B. Bratton showed chronic purulent leptomeningitis over the cerebral cortex. Congestion and slight glial proliferation near vessels in the basal ganglia. Lungs showed early organisation of bronchopneumonia and slight heart-failure change. Cloudy swelling of liver and congestion of centres of lobules; congestion and slight chronic inflammatory reaction in spleen; congestion and cloudy swelling of kidney. Slight chronic ileitis.

Since the organism concerned in this case was grown from the gall-bladder and from the ileum, which also showed some histological evidence of inflammation, it seems probable that the meningitis was a blood-borne infection from the alimentary tract.

Dr. W. Allen Daley, medical officer of health to the London County Council, has given us permission to describe this case. We wish to thank Mr. R. J. Holt, laboratory technician, for his help.

Reviews of Books

An X-Ray Atlas of Silicosis.

By A. J. AMOR, M.D. Lond., M.Sc. Wales, medical officer to Mond Nickel Co., Swansea. Bristol: John Wright and Sons. Pp. 206. 30*s*.

THE main body of this book consists of radiograms of the chest in silicosis, facing which are case-notes in English and French. The plates in the earlier part of the book show non-specific and typical specific changes, those in the next sections silico-tuberculosis and acute silicosis. The special X-ray features of silicosis in various industries are then illustrated, and after a section on further complications the differential diagnosis is described and illustrated. The radiograms are preceded and interspersed with general explanatory matter on the ætiology, pathology, radiology and clinical manifestations of silicosis. In a foreword Sir Wilson Jameson recommends the book for industrial medical officers, and as a short practical book on this protean disease it is excellent. The reproduction of the plates is successful except, as might be expected, for the lighter changes grouped as non-specific, to which enlargements or drawings might have been added with advantage. The case-notes are precise and instructive; and the author has succeeded, in spite of the controversial nature and many unsolved problems of silicosis, in maintaining a balance representing the consensus of present opinion. The social aspects, too, have not been overlooked; thus it is pointed out that the existing compensation laws are such that the silicotic who is incapacitated for work is immediately placed in an economic state which brings his standard of living close to the starvation line, with a resulting increased liability to tuberculosis. Drawbacks to the book are mainly the outcome of condensation, which entails somewhat dogmatic presentation. Thus the remark that "there is certainly no sound reason for believing that tuberculous infection of the lung is modified in any beneficial manner by the presence of coal dust" does not take into account Prof. Lyle Cummins's experiments on the adsorption of tuberculin by coal dust. Nor is it accurate to say that the belief (based on the Registrar-General's returns) that pulmonary tuberculosis in the coal-mining industry is less common than among the general population has proved fallacious. The most recent figures confirm the low tuberculosis mortality for miners of bituminous coal —the great majority of British miners—but not for anthracite miners presumably because of the latter's high incidence of silicosis.

The atlas is a fine achievement which can be strongly recommended for postgraduate students.

Personality and Mental Illness

By JOHN BOWLBY, M.D. Camb. London: Kegan Paul, Trench, Trubner and Co. Pp. 280. 10*s*. 6*d*.

Dr. Bowlby has written a provocative book, distinguishing from a long list of character traits commonly observed in psychiatric patients 33 which he regards as specifically schizoid and 72 which he thinks are non-specific. The latter are distributed among both depressive and schizoid personalities. His work has admittedly been on a small group of cases, but he claims no more for it than that it should stimulate others to record observations of a similar kind. Only in this way does he see a likelihood of establishing sounder methods of recognising and avoiding such reactions. He rejects as artificial the separation, suggested by Jung, into extraversion and introversion, and in so doing pays tribute to the careful and accurately worded observations of Kretschmer. His plea is that similar observations on normal people, as well as so-called psychopaths, neurotics and psychotics, should be recorded, so that in follow-up studies use may be made of the patient's early history, and his reactions prior to illness. Perhaps, in the light of this study, such records would reveal the character traits relating directly to the type of breakdown which he has experienced.

Bowlby agrees with Lewis in seeking to abolish hard and fast distinctions between the neuroses and psychoses; study of his own cases leads him to conclude that the great division is not into manic-depressive illness and schizophrenia, much less into neurosis and psychosis. His classification follows Bleuler in separating off the schizoid from the syntonic personality and he then subdivides both according to Cattell's grouping of surgent and desurgent, the out-going active and in-turned passive type of reaction respectively. Thus, his sub-grouping of schizoid personalities includes among the desurgent "the saint-like, cold solitary and apathetic asocial" types, and in the surgent group the hysterical and shameless antisocial schizoids. The difficulty with any system of classification which attempts such grouping lies in the borderline case, in which personal judgment would ultimately decide on a label of anxiety state as against depressive state; and Bowlby faces this difficulty frankly, admitting that no classification can be watertight. What he does is to assemble and regroup his cases in such a way that the outstanding personality traits are recognised and related to such accentuations and distortions as may be regarded as pathological. He suggests that if every case was reviewed in the light of whether "he is syntonic or schizoid in make-up, prognosis would become more reliable, treatment more intelligent and psychopathology more scientific." The book does far more than reassemble for the reader the earlier work on psychological types; it contains much shrewd and critical observation, checked by a careful study of Dr. Bowlby's own detailed case-histories.

Architecture of the Kidney in Chronic Bright's Disease

By JEAN OLIVER, professor of pathology, Long Island College of Medicine. New York: Paul B. Hoeber. Pp. 256. $10.

THE complicated structure of the kidney has naturally led to the suggestion that the different parts possess specialised and different functions. Unlike organs such as the liver, in which each cell can perform independently every function of the organ, the kidney is composed of complete units differing widely in their histological appearance and structure. Function and structure in the normal kidney have been correlated sufficiently to provide a reasonable theory of the mechanism of normal kidney function. Prof. Jean Oliver extends this method to the domain of pathology and provides an excellent description and review of the histological renal changes which are found in the kidneys of chronic Bright's disease. He has carried out much of the work himself and several of the original views expressed are based on careful and painstaking investigation. He quotes evidence to show that the aglomerular nephrons often seen in specimens of diseased kidneys are, at least to some extent, capable of replacing functionally the destroyed glomeruli, and that, in a sense, regeneration of functional tissue thus takes place in the diseased organ. He also shows that new vessels may arise in disease to supply the tubules so that they no longer depend on an intact glomerulus for their blood-supply. The effect of physical blockage in the distal part of the nephron and its effect on structure is well brought out. His methods in delicate experimental work were already known to some of us here; they are set out fully for those who wish to study them. The many illustrations include microdissections and photomicrographs of normal and diseased kidneys. Professor Oliver admits that the story of function and structure is still far from complete, but he has done much to clear the way for further study. The book is brimful of observations and suggestions.

THE LANCET

LONDON: SATURDAY, MAY 24, 1941

PAROXYSMAL HÆMOGLOBINURIA

PAROXYSMAL hæmoglobinuria is especially associated with primary hæmolytic anæmias and with blackwater fever. Research into these diseases has been pursued independently on the whole, since the primary hæmolytic anæmias occur mostly in temperate climates while blackwater fever is limited to malarial zones; the results taken together, however, suggest a close relationship. Hæmoglobinuria results when sudden intravascular lysis of red cells releases free hæmoglobin into the plasma in amounts sufficient to exceed the renal threshold. The effects of injecting hæmoglobin solutions freed from red-cell stroma substance into the blood-stream have been followed in experiments by FAIRLEY [1] and by GILLIGAN and his colleagues [2]; the results show that hæmoglobin appears in the urine when the free hæmoglobin in the plasma exceeds 100–140 mg. per 100 c.cm. Only about a tenth of the released hæmoglobin is so excreted; the rest disappears—devoured by reticulo-endothelial cells or metabolised into other blood pigments. The presence of hæmoglobinuria is thus a sign of considerable intravascular hæmolysis. In outline this account of the production of hæmoglobinuria fits all cases, whatever the initial cause, with the possible exception of "march hæmoglobinuria" which may be due to local renal hæmorrhages.

The question at issue then is, what causes the intravascular hæmolysis that liberates free hæmoglobin into the plasma? The paroxysmal hæmoglobinuria of blackwater fever is associated with repeated attacks of, or continuous infection by, subtertian malaria. A connexion had been noted between quinine treatment of the malaria and the onset of hæmoglobinuria, and PONDER and ABELS [3] found that when quinine was given to rabbits the red blood-cells became less resistant to the lytic action in vitro of substances like the bile salt, sodium taurocholate. Quinine itself, in concentrations similar to those prevailing in the blood was not hæmolytic and hence they thought that quinine acted by accelerating the action of intravascular lysins. MER and his colleagues [4] confirmed this by showing that the red cells of malarial patients were rendered more sensitive to lysis by bile when quinine was given. FAIRLEY and MURGATROYD [5] had a patient with mild blackwater fever in whom they observed that the accelerating effect of quinine was related to the activity of the malarial parasites; when the malaria was inactive, hæmoglobinuria was not brought on by giving quinine. Quinine is clearly not the primary cause of attacks of blackwater fever; the disease occurs in patients treated with Atebrin and Plasmoquine, and CONNAL [6] recorded that mortality among regular quinine takers was only half of that among the "seldom takers."

In 1937 FAIRLEY and BROMFIELD [7] described the formation of a new pigment in the plasma of blackwater-fever patients which they called pseudo-methæmoglobin—a name later altered in the light of more precise knowledge to methæmalbumin. They thought that methæmalbumin was peculiar to blackwater fever and suggested that there was a metabolic disturbance due to the malarial infection that led to lysis of the red blood-cells with formation of this special pigment. Later, however, it was found [1] that methæmalbumin appeared in human plasma after any hæmolytic event. FAIRLEY [8] then proposed another explanation: that chronic malaria leads to hypertrophy of the reticulo-endothelial cells and a pathological increase of their normal phagocytic functions, including erythrocyte destruction. He postulates an intracellular lysin or enzyme normally responsible for the destruction of aged erythrocytes; in chronic malaria formation of this lysin is increased and it is liberated into the circulation, where it becomes fixed at once to the red cells; chronic overflow accounts for the hæmolytic anæmia, sudden liberation in large amounts leads to the severe hæmoglobinæmia and the consequent hæmoglobinuria of blackwater fever. Several supporting points for this attractive theory can be derived from researches on the primary hæmolytic anæmias. In paroxysmal nocturnal hæmoglobinuria, hæmolysins which cause a parallel syndrome have been identified and their properties studied. In the patient described by DACIE, ISRAËLS, and WILKINSON [9] the hæmolysin was most active when the reaction of the blood was rather more alkaline than usual, so that only during the night was the hæmoglobin in the plasma raised sufficiently to overstep the renal threshold and cause hæmoglobinuria, but the steady drain led to a chronic hæmolytic anæmia. Hypertrophy of the splenic histiocytes has been the characteristic feature of groups of adult patients with hæmolytic anæmia reported by several workers; some of them had paroxysmal hæmoglobinuria and thus only differed from FAIRLEY'S cases in the absence of a known agent causing the reticulo-endothelial hypertrophy.

During the last few years most work on the primary hæmolytic anæmias has emphasised such changes in the red cells as spherocytosis and increased fragility; but, though some observers have thought that these were primary, current opinion now regards them as secondary to the hæmolytic process, and again results from blackwater-fever patients agree.[5] The work of DAMESHEK and SCHWARZ [10] again brought up the question of hæmolysins as the cause of these primary hæmolytic anæmias; but in most of their patients no hæmolysin could be found. They accounted for this by pointing out that relatively large concentra-

1. Fairley, N. H. *Brit. med. J.* 1940, **2**, 213.
2. Gilligan, D. R., Altschule, M. D, and Katersky, E. M. *J. clin. Invest.* March, 1941, p. 177.
3. Ponder, E. and Abels, I. C. *Proc. Soc. exp. Biol., N.Y.* 1936, **34**, 162.
4. Mer, G., Birnbaum, D. and Kligler, I. J. *Trans. R. Soc. trop. Med.* March, 1941, p. 373.
5. Fairley, N. H. and Murgatroyd, F. *Ibid*, 1940, **34**, 187.
6. Connal, quoted by P. Manson-Bahr in Manson's Tropical Diseases, London, 1940, p. 86.
7. Fairley, N. H. and Bromfield, R. J. *Trans. R. Soc. trop. Med.* 1937, **31**, 139.
8. Fairley, N. H. *Ibid*, 1940, **34**, 173.
9. Dacie, J. V., Israëls, M. C. G. and Wilkinson, J. F. *Lancet*, 1938, **1**, 479.
10. See *Lancet*, 1940, **2**, 73.

tions of hæmolysin are necessary for demonstration in vitro and that the occurrence of spherocytosis and similar changes in the red cells is indirect evidence of their presence. The sceptic may say that there is little to choose between a circulating hæmolysin, present in subdemonstrable concentrations, and an intracellular lysin that if liberated is fixed at once—the presence of either being only inferable from secondary changes in the blood-cells. Both suggestions seem to have more than their fair share of speculation, and they take no account of lysolecithin, the effect of stasis of blood in the spleen, and other points which have been raised in this connexion. But it is encouraging that the students of primary hæmolytic anæmias and of blackwater fever should have reached similar conclusions about the cause of these diseases. Pooling the results of research on all hæmolytic anæmias, temperate and tropical, should produce further advances.

THE PHYSICIAN AS COMFORTER

THE commonest motives that send patients to their doctors are pain and fear. They teach us much in the schools about pain, its mechanism, its diagnostic significance, how it may be relieved; but less of fears and anxieties, the forms they take, how they may be uncovered in their hiding places, and how removed. They leave it to our native wit and sympathy to learn the ways of fear as we gather our experience of sick and healthy humanity. Yet a little guidance would make many of us better doctors. Prof. J. A. RYLE, in a recent clinical lecture at Guy's Hospital,[1] commented on those unfounded fears of disease which often give rise to puzzling symptoms unassociated with physical signs and which he calls nosophobias. They range from grossly obsessional phobias, often syphilophobia, which are deep-seated in psychoneurotic personalities, to that exaggerated but superficial fear which often provokes a doctor or a medical student to dread some serious cause for a trivial symptom in himself or a relative. They include the fears of heart disease, of high blood-pressure, of pulmonary tuberculosis and the like, engendered either by unwise talk and excessive examination on the doctor's part, or by the patient's recent experience of these conditions in relatives or friends. Cancer phobias are common, because the lay mind thinks of cancer as bringing a long and painful illness with an inevitably fatal end; yet many forms of cancer are now curable, if treated early, and many cancer patients escape great pain. But the disease is grave enough, and it is little wonder that fear dominates the mind of a patient who has recently seen painful cancer in another and now himself experiences an apparently similar pain. The doctor must examine such patients thoroughly, and understand their phobia sympathetically—he must find his way into the patient's mind, and appreciate what mixture lies there of knowledge, ignorance and apprehension—then his confident reassurance will cure them. There lies before the profession a two-fold task: to teach the intelligent public the facts of physiology and medicine in better perspective, counteracting fussy apprehension among the half-informed; and to undertake with greater understanding the doctor's task as comforter. It were well that the medical student should be taught to begin his interrogation with "What are you complaining of? And what are you afraid of?"

The physician as comforter is the theme of a little group of essays[2] which Ryle has added to his widely read paper "On Death and Dying." Death is more imminent than usual in these days, and the fear of death perhaps more prevalent. Yet the process of dying, so far as its closest observer, the medical man, can judge, is only exceptionally a painful or unpleasant one. Like the fear of death, the fear of pain is commonly exaggerated in the lay mind. The air-raid casualty wards of this war, like the casualty clearing stations of the last, have been filled with broken bodies and mangled flesh; yet most of the injured lie still and quiet, a few only show signs or have recollection of suffering much pain. Couple that observation with an understanding of the biological significance of pain in signalling disorder and enforcing rest, and the reasonable man will no longer dread it, but will dwell rather on his own good chance of escaping it, or will hope, with medical aid, to endure it bravely. Even fear itself can be shown, in the bodily reactions of animals, to have a biological "purpose"; it accompanies, and in reasoning man it may even be said to provoke, actions that avoid or withstand danger and aid preservation. But in unreasoning man fears may be liars, when they are superstitious, when they are exaggerated by ignorance, or when they become epidemic as panic. More knowledge of the objects of fear, and some appreciation of its biological genesis, will make it a good servant instead of a bad master.

The physician cannot advise others how to behave in difficult situations without having some working idea as to the pattern and purpose of human life. Ryle is no mechanist; he sees more in life than can be compassed by physics and chemistry, and holds that the doctor's modern scientific training leads to a study of man which is too narrow and too objective. The scientific approach should form merely a part of a wider study of man as a whole and in his environment, in the spirit of the naturalist school, deriving from HIPPOCRATES, which "has always based its doctrine on close observation and that intimate form of human understanding which is best conveyed by the Greek word sympathy." Between the purely materialist and the devoutly religious philosophies, Ryle stands intermediate, as a naturalist and humanist. For him, man has an allotted task to fulfil—that of using his gifts of body and mind to the utmost and the best of which they are capable. Ryle finds implicit in nature and human society a principle of mutual aid, which should be an important ingredient of effective living, and should teach modern science that it has social and moral as well as academic functions. The principle sounds like brotherly love under another name; if so it helps to bear out the thesis that the ultimate sanctions of religion lie in human and natural experience. Indeed, when the physician as scientist turns into the physician as comforter, he assists in the dialectic process whereby science and religion, last century in antithesis, are in this moving towards synthesis.

1. *Guy's Hosp. Gaz.* April 5, 1941, p. 76.

2. Fears may be Liars. London: Allen and Unwin. Pp. 95. 3s. 6d.

EUMYDRIN IN CONGENITAL PYLORIC STENOSIS

THE relative merits of surgery and medicine in the treatment of congenital pyloric stenosis have been hotly debated for years, and the medical protagonists, who have been getting the worst of it, will take fresh heart from the reports of DOBBS[1] (in this issue) and of MACKAY[2] on their experience with Eumydrin (atropine methyl nitrate.) The use of this drug, which has about half the antispasmodic action and a fiftieth of the toxicity of atropine, was originally suggested by USENER some fifteen years ago. In 1935 SVENSGAARD[3] of Copenhagen compared her results in 61 cases treated with eumydrin with those of surgery and of medical treatment with atropine; she concluded that eumydrin was more effective and less toxic than atropine, but that either gave better results than surgery. There was only one death in her eumydrin series, but later workers in Britain, Sweden and Germany have been less fortunate. DOBBS and MACKAY have each treated 40 cases and each had 5 deaths—a fatality of 12·5%. Compared with this, THOMPSON and GAISFORD[4] treated 209 cases surgically mostly in hospital with a fatality of 13·4%. RAMMSTEDT himself, on the other hand, had only 2 deaths in 60 cases operated on, but few others have been as successful as this except in private practice, where the danger of intercurrent infection can be largely eliminated. Moreover, such reports have come from surgeons with exceptional experience working in close coöperation with the pædiatrician. Pyloric stenosis is not so common that every surgeon can be expert in Rammstedt's operation, a short but ticklish one, and this consideration must increase the value of a medical method by which infants living out of the reach of skilled teamwork can be cured.

The technique of eumydrin treatment is not yet settled. Daily gastric lavage is given as a routine by DOBBS, but MACKAY and SVENSGAARD think washouts unnecessary. DOBBS advises small feeds to begin with, gradually working up to an adequate diet, as after operation, but MACKAY was equally successful with three-hourly feeds from the start, only slightly reducing their strength for the first few days. It is essential in these children to overcome dehydration as quickly as possible, for serious intoxication may result from giving eumydrin to a dehydrated child, and DOBBS gives subcutaneous salines until there is a satisfactory passage of urine. But MACKAY is convinced that too high a fluid intake reduces both the effectiveness of the drug and the baby's appetite, and probably accounted for some of her failures; except while there is obvious dehydration she therefore advises fluids by mouth only and limits them to 3 oz. per pound body-weight in the first 24 hours and thereafter gives only as much as the baby really wants. The eumydrin, one part in 10,000 of water, is given half an hour before each feed, beginning with 0·5–1 c.cm. and increasing to 2·5–3 c.cm. Toxic symptoms, though less common than with atropine, do arise, especially fever and abdominal distension, and must be an indication for omitting at least one dose of the drug. The watery solution of eumydrin does not keep well, and must be freshly made each week. This last difficulty is overcome in WALLGREN'S[5] method, for he uses a 0·6% alcoholic solution which is stable. This solution is given in drop doses on the tongue, and is said to be both less toxic and more effective; it need only be given once or twice a day. DOBBS reviews each case at the end of a week or ten days, and if there is no decisive improvement an operation is done promptly.

It is not yet possible to tell when the baby is first seen whether it should be operated on without delay or whether eumydrin is likely to be successful. DOBBS got his best results in infants who were over four weeks old when projectile vomiting began, especially when they had gained on their birth-weight. Presumably, however, these are the cases which will do well with any treatment. In deciding between surgery and medicine the doctor has to balance the risks of operation against those of a long stay in hospital, for in skilled surgical hands the child may be fit to leave hospital within 7–10 days, whereas a child treated medically may have to stay some weeks; the average stay in MACKAY'S successful cases was 4 weeks. In Scandinavia the risks of cross-infection in children's wards seem largely to have been overcome, but here this is only so in the rare hospitals where each baby can have a separate cubicle. There, too, children's nurses seem to be more plentiful. It seems, then, that eumydrin will have its greatest application in the milder cases which can be treated as outpatients, in the older cases which are not likely to be long in recovering, and in those circumstances where strict isolation is possible with a generous provision of nurses.

1. See also *Lancet*, 1939, **1**, 12.
2. Mackay, H. M. M. *Arch. Dis. Childh.* March, 1941, p. 1.
3. Svensgaard, E. *Ibid*, 1935, **10**, 443.
4. Thompson, W. A. and Gaisford, W. F. *Brit. med. J.* 1935, **2**, 1037.

MEDICAL PLANNING COMMISSION

SIXTY-ONE of the 67 members of the Medical Planning Commission met on May 7 to discuss scope and procedure. Mr. H. S. SOUTTAR, unanimously elected to the chair, said its aim was to provide every member of the community whatever his economic status with all necessary medical resources, while maintaining the close personal relation between doctor and patient. The whole resources of the B.M.A. were at its disposal but the commission was an entirely free body, not bound by any preconceived policy. Lord DAWSON (whose own proposals were pigeon-holed in 1920) emphasised the degree to which medical knowledge had outstripped the organisation of the practice of medicine. Inevitably the practice of medicine was becoming more and more institutional and they must apply collectivism to the fabric without sacrificing individualism in the human relationship. It was only recently that constructive health had really become part of medical thought. Mr. SOMERVILLE HASTINGS commended starting with a survey of the various fields, expediency to come first and principles of organisation last. On this common basis of agreement the commission became severely practical and set up five committees to deal with general practice, special practice, public health, hospitals, and teaching hospitals (including clinical education), with a sixth committee to integrate their reports. Each of these committees is at liberty, with the authorisation of the chairman, to coöpt up to four additional members. But there is to be no further sectional representation except the addition of the chairman of the Nuffield Medical Advisory Committee and four general practitioners (one from a colliery area) to be chosen by the Insurance Acts Committee.

5. Wallgren, A. *Arch. Dis. Childh.* 1940, **15**, 103.

Annotations

WHEY

THIS summer, Lord Woolton has told us, we shall probably have more milk than we need. At any rate our need may be greater next winter and accordingly some of the milk will be made into cheese for safe keeping. In the past this has been done wastefully. Most of the albumen in the milk and all the sugar has been regarded as a trade effluent, and a very harmful effluent at that because the lactose and bacteria together have starved the fish of their oxygen and the cheese factory has proved more damaging to river live-stock than is the sewage farm. But this year such waste will not be tolerated and necessity being the mother of invention means will be found to condense or dry the whey so as to make it available for human food or to replace dried separated milk in rearing calves. Whey, as Sir Gowland Hopkins points out in a letter to the *Times* of May 17, contains all the lactalbumen, nearly half the calcium, most of the other salts, nine-tenths of the vitamin B_1, three-quarters of the riboflavin (vitamin B_2), and a very large proportion of the lactose of the original milk. Spray-dried whey, with its 12 per cent. of first-class animal protein, makes an acceptable addition to many kinds of table dishes. Hopkins estimates that at least 15,000 tons of dried whey should be available in the coming summer. But this is only about half a pound per head of population and many of us will be happy to get any.

A QUININE DERIVATIVE FOR PNEUMONIA

FOR generations quinine has had its advocates in the treatment of pneumonia, and more than 25 years ago a quinine derivative, Optochin (ethylhydrocupreine), was shown to have a specific action on pneumococci. It is strange now to read that W. E. Dixon quoted this in 1922 as the only instance of specific drug therapy in acute general bacterial disease. This drug sometimes damaged the vision, and it was therefore discarded. Next came Solvochin, which had an extensive vogue on the Continent and a lesser one in this country before the advent of the sulphonamides. Now the quinine idea has been revived in the use of hydroxyethylapocupreine in a series of cases of pneumonia in Pittsburgh. At the Mercy Hospital Prof. W. W. G. Maclachlan and his colleagues [1] introduced this compound in 1935, using a dosage of gr. 15 three-hourly for 3–4 days. They have now compared their results over a five-year period with those in a control series treated with sulphapyridine. In the 494 cases treated with the quinine compound the fatality was 24%, yet in their experience this figure was little higher than the best obtained with sulphapyridine. All their patients were adults, and their series contained a high proportion of patients over middle age. In 1939 they treated 79 cases with hydroxyethylapocupreine either alone or with a sulphone glucose derivative which was soon discarded as ineffective. The average age of this group was 46 years and the fatality 24%. Of the 31 cases treated with sulphapyridine in the same period the average age was 56 and the fatality 22%. Nausea and vomiting were slight from the quinine drug and no other toxic manifestations were met with, but these advantages over the sulphonamides seem more than counterbalanced by its ineffectiveness in pneumonias of non-pneumococcal origin.

This drug has been used by Menten and MacDonald,[2] also of Pittsburgh, in the conservative treatment of empyema in children. In 25 cases 25–150 c.cm. of a 1% solution of hydroxyethylapocupreine dihydrochloride were injected into the empyema cavity every third day after aspiration of as much pus as possible. The number of tappings required varied from 3 to 12, and 14 of the 25 children were discharged cured, the remainder having a rib resected. From the child's point of view a simple rib-resection would as a rule be preferable to the repeated ordeal of aspiration and injection, and since irrigation with a saturated solution of sulphapyridine after rib-resection leads to rapid sterilisation and clearing of the empyema cavity Menten and MacDonald's method is not likely to find many adherents.

1. Maclachlan, W. W. G., Johnston, J. M., Bracken, M. M. and Pierce, L. S. *Amer. J. med. Sci.* March, 1941, p. 367.
2. Menten, M. L. and MacDonald, R. R. *Penn. med. J.* 1940, **43**, 1305.

GUY'S IN THE COUNTRY

LIKE many other teaching hospitals Guy's has suffered as the result of enemy action; but, although the activities of the hospital have been considerably curtailed, neither the inpatient nor the outpatient department has yet been compelled to close its doors for a single day. Nevertheless the suggestion of the Ministry of Health that the teaching hospitals should establish annexes outside London was gladly accepted by the governors of Guy's, partly out of a desire to provide additional beds in a safer area for the civilian sick and for air-raid casualties from the Borough, and partly to ensure, as far as is humanly possible, that the continuity of the hospital, unbroken for more than two hundred years, should be maintained. Unfortunately the geographical position of the sector in which Guy's is the apical hospital renders it exceedingly vulnerable, and relatively safe areas are not easy to find. Thus it is not surprising that the hospital was unable to secure as large a building as the governors would have liked; and indeed it was highly fortunate to be offered the greater part of a country club which is now in process of being adapted to provide a hospital of 110 beds. The club is a fine old country mansion, substantially built with a series of large, lofty, beautifully decorated public rooms on the ground floor, now being converted into wards. The windows look out over park and well-wooded downland—a very different view from that which meets the eye from the east windows of Hunt's House, even since the Nazi clearance of the site has widened the horizon. There is no lift big enough to take a bed or a stretcher, but the staircase is wide and easy. On the first floor a series of large bedrooms and private suites will provide a number of small wards, containing 2–5 beds each, rooms for the resident medical staff, an operating-theatre suite and an X-ray room. If the demand arises, arrangements can easily be made to provide accommodation for a limited number of paying patients. The second floor affords sleeping quarters for about 40 sisters and nurses, while an exceptionally roomy basement will house the clinical laboratory, kitchen premises, nurses' dining-room and the air-raid shelter.

Since the decision was taken to establish an annexe at this club, the American organisation, "Bundles for Britain," has become keenly interested; its Hollywood branch has adopted Guy's and is to present the additional equipment that will be needed. After an initial gift of $10,000, the complete equipment of the operating theatre has been provided and a deep-X-ray plant is on the way, while other expensive instruments and articles of hospital furniture—such as fracture beds—have been promised. In appreciation of these gifts the governors have named the annexe "Guy's U.S.A. Hospital." The deep X-ray plant will replace the plant destroyed by fire in December, 1940. On that occasion the Guy's fire-watchers and fire-fighters succeeded in preventing any damage to the hospital buildings except a part of the roof of Hunt's House, in the top floor of which the deep X-ray therapy department was situated. The new plant will be housed in a hut specially erected for it, communicating with the ground floor of the main building by a short covered way. It may be possible to associate radium therapy with the deep X-ray work, so that treatment of patients suffering from the appropriate

types of malignant disease can be undertaken again at once. At the present time facilities for radiotherapy are greatly reduced though the demand for this form of treatment is considerable.

Only inpatients will be taken, for the most part air-raid casualties and civilian sick from Guy's and its outpatient waiting-list. It may be possible to run a daily ambulance service between the hospital and the Borough, and for this purpose an American ambulance, presented some months ago by friends of the hospital in New York, will be of great service. Staffing an annexe 25 miles out of London presents difficulties, but fortunately there are members of the Guy's staff attached to and living in or near the local county hospitals, and a young surgeon of experience has been appointed as R.M.O. The annexe is unfortunately too small to house even a fraction of the medical school, but some members of the staff will take their students down to the hospital for teaching rounds so that it will play a part, though a small one, in medical education.

MENINGOCOCCI IN THE PHARYNX

FROM observation of cases of cerebrospinal fever in the B.E.F. in France, van Rooyen and Morris[1] conclude that treatment with sulphapyridine is highly satisfactory—of 200 consecutive cases in young soldiers only 3 were fatal. In convalescents on the eve of their discharge from hospital meningococci were isolated from the pharynx in only 3 cases out of 113, and those may well have been reinfections. This bears out Fairbrother's[2] experience, for in 14 recovered cases he was unable to isolate the organism in a single case. Before the introduction of the sulphonamides a much higher persistence in convalescents was usual. An average finding was that of Netter and Debré in 1911—15–25% after the fourth week—and Embleton and Steven in 1919 even reported that every one of 86 cases investigated became a prolonged carrier. It can hardly be doubted, therefore, that the relative freedom from meningococci of convalescents who have been treated with sulphonamide drugs is a direct effect of the drug. This conclusion is strengthened when we consider the effect of sulphonamides on carriers of the meningococcus. Meehan and Merrilees[3] cleared all but 6 out of 75 carriers by a single course of sulphapyridine, and thereby appeared to bring to an end an epidemic which had prevailed over three seasons in a closed community. Later, Fairbrother showed that a course of 4 g. of sulphapyridine daily for 2 days, followed by 3 g. daily for 2 days, could generally be relied on to clear the nasopharynx of either group I or group II meningococci. van Rooyen and Morris now report the clearance of 35 out of 36 carriers by a course of sulphanilamide. Mass chemotherapy, however, is not yet for general application. In a closed community under certain circumstances it would be justifiable and likely to be effective. It is noteworthy, as Fairbrother found, that other organisms in the pharynx, such as hæmolytic streptococci, are much less vulnerable to the action of sulphapyridine. Although van Rooyen and Morris suggest the contrary, they give no actual data in support of their impression.

In meningococcal meningitis about a quarter of the cases show clinical evidence of an acute pharyngitis. Is this pharyngitis caused by the meningococcus or by other organisms? This question is still in doubt. Dopter maintained that there was always a catarrhal stage in meningococcal infection, but in many cases it could not be demonstrated clinically and opinion swung away from this conception. Now there is a tendency again to visualise a causal relationship between the meningococcus and pharyngitis under certain conditions. van Rooyen and Morris describe 6 cases of "meningococcal tonsillitis with pharyngitis" from 4 of which a profuse growth of group I meningococcus was obtained and from the remainder a mixed growth of meningococcus and *Streptococcus viridans*; other pathogenic organisms which are usually associated with catarrh in the pharynx were absent. It would be desirable to have blood-cultures and immunity reactions, such as the complement-fixation test, worked out in connexion with such investigations, and this gap in our knowledge might thereby be filled.

1. van Rooyen, C. E. and Morris, J. C. *J. Roy. Army med. Cps*, April, 1941, p. 200.
2. Fairbrother, R. W. *Brit. med. J.* 1940, **2**, 859.
3. Meehan, J. F. and Merrilees, C. R. *Med. J. Aust.* July 27, 1940, p. 84.

VILLAGE REPAIR SHOP

FOLLOW-UP studies have proved of great value in the struggle against self-deception and prejudice in psychiatric treatment. Coon and Raymond[1] give an account of the patients diagnosed as anxiety neurosis and neurasthenia which were treated between 1910 and 1934 in Dr. Riggs's treatment centre in Stockbridge, Massachusetts. It was established in 1908 "with a studied avoidance of any atmosphere suggestive of institutional life," in a small New England village. Patients and doctors live in the village houses; nurses are without uniforms. There are facilities for occupational and recreational therapy and each patient has a daily time schedule which leaves him little leisure, but Riggs's principal therapeutic method is re-education. The patient should gain "as much useful insight as possible into the origin and nature of his disability." He has to study five pamphlets on psychology which are handed to him on his arrival. With medical help, he has to find a "satisfactory, logical formula" for his own complaints within the framework of this popular psychology, and to build up the plan for his readjustment. The pamphlets provide an instructive clue to the outlook of the middle-class American for whom they are devised. They are skilfully worded, simple and clear like the practical treatises of the Jesuits, of course without any religious and with little philosophical background. Everything is centred around a few slogans such as "hypersensitivity," "the cause of neurotic maladaptation," "accepting reality," "the way to rehabilitation," "Stockbridge stands by," and the centre's readiness to help in any later difficulty. Riggs has always been interested in the follow-up of his patients and he instigated the present study which is the three years' work of an independent research group.

The clinical material is a sample of 1060 patients with symptoms of anxiety chosen from a total of 5300 treated at Stockbridge. A division into sub-groups which seems rather artificial is attempted with the help of "dynamic" concepts of Meyerian psychiatry; the impression of artificiality may be produced by the short and colourless case-histories from which all concrete facts have been omitted, probably for reasons of discretion. But it is always difficult to form an opinion on the basis of other people's case-histories. The best results of the Stockbridge therapy were achieved in a group of "energetic, ambitious individuals who broke down following marked fear of failure, evident overwork and increasingly ill-balanced programmes of daily living." Statistical methods have been applied so prudently and cautiously in the analysis that one can call this an exemplary investigation of its kind. Its only disadvantage—arising from the social standing and wide geographical scatter of the patients—is that the follow-up was done by letters only, letters to the former patients and their doctors. The patients' average stay in Stockbridge was only 30 days, often followed by therapeutic correspondence and shorter visits to the centre. Information on the course of the case after discharge was available in 96% of all patients; but at the time of the investigation (1936–39), the condition of 36% could not

1. A Review of the Psychoneuroses at Stockbridge, by Gaylord P. Coon, M.D. and Alice F. Raymond, A.B. Stockbridge, Mass.: Austen Riggs Foundation. Pp. 299.

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be found out. At this time 30% were much improved, 28% improved and 6% unimproved. Comparison with similar reports from other institutions have been attempted, but they were rendered difficult because most of the others fail to state the number of unknowns. This work will be of special value one day when our present experiences of war-time neurotics can be followed up and compared with the peace-time clientele of Stockbridge.

MEASURING APTITUDE

IN the last war, Dr. C. S. Myers records,[1] he found one of our most distinguished mathematicians counting railway tickets in the marshalling yard of a harbour station; and it was some time before his abilities were given proper scope in solving gunnery range-finding problems. In this war many of us could tell of other lights under bushels, though perhaps not such brilliant examples as the one quoted. It is encouraging to learn, however, that the authorities are beginning to use more freely the information which experts in vocational selection can now put at their service. Vocational and intelligence testing, which have sometimes been held in suspicion as a species of trickery unfair to the subject, have become increasingly reliable in recent years. They are not, of course, the only methods by which capacity is assessed; indeed, they are merely accessory to other and more general methods of approach; but they can be used successfully to measure aptitude in recruits to such technical units as the tank brigade and the gunners. Dr. Myers mentions the commander of an artillery regiment who has invited psychologists to examine his recruits and has used the results to select range-takers and other skilled gunnery assistants. Batches of recruits to the R.A.M.C. have also been examined with a view to choosing suitable men for special duties, and discovering those who are backward and would profit by special instruction.

Other problems in efficiency are still the subject of research. Dr. Myers mentions two university laboratories at which experiments are being made on individual differences in speed and degrees of dark adaptation of the eye, as it affects airmen; and on the errors to which pilots become liable after prolonged periods of flying blind. In yet another sphere, psychologists have been able to plan instruction courses for those in industry so that maximum capacity may be quickly developed, and mistakes recognised and avoided. Advice has also been given by industrial psychologists on arrangement of shifts in factories, rest pauses and hours of work. It is unfortunate and extraordinary that in many factories the relation of hours of work to output is still not recognised, and that men are still working ten and eleven hours a day for seven days a week to the detriment of their output, their health and the nation's interests.

LIVER IN PERNICIOUS ANÆMIA

AT the present rate the word offal will soon become synonymous with tit-bit, for the parts which come under this heading are taking an increasingly important place in human dietary. Sweetbreads are the source of insulin, liver contains the curative factor for Addisonian pernicious anæmia, and today, in the midst of war, offals have become a rationed food, difficult to obtain, valued not only for their specific properties but also as a source of first-class protein. Any means of reducing their excessive consumption by one group in the community will increase the supplies for the country as a whole. A memorandum by the food rationing (special diets) advisory committee of the Medical Research Council, referred to in our columns last week, makes it clear that patients with pernicious anæmia are still being treated with fresh liver by mouth in spite of the known fact that liver given in the form of a highly concentrated extract by intramuscular injection is both cheaper and more effective. The committee have advised that fresh liver is not necessary for treatment except possibly in those rare cases in which extracts give rise to anaphylactic shock. On another page, however, Dr. C. T. Andrews shows that it is possible to desensitise a patient to liver extract, so that even this exception no longer holds good. The committee point out that no patient with pernicious anæmia can be regarded as under proper therapeutic control unless the red-cell count is 5,000,000 per c.mm. and the hæmoglobin 100%. To maintain this blood picture it is necessary to eat phenomenal quantities of raw liver, which very few people can continue to do for long. On the other hand, 1–2 c.cm. of liver extract once every two or three weeks will in the majority of patients produce the desired result. So convinced are the members of the advisory committee of the fact that no patient with true Addisonian pernicious anæmia is resistant to treatment with parenteral extracts that they have agreed to investigate any case of anæmia which a medical practitioner finds is responsive to fresh liver but not to parenteral extract.[1] The committee recognise, of course, that certain patients may be diagnosed as having pernicious anæmia when in reality they are suffering from some other condition, especially malignant deposits in the bone-marrow or some disturbance of intestinal function. For the former nothing can be done; for the latter other associated dietary deficiencies must be remedied and an attempt made to relieve the underlying intestinal abnormality. The memorandum points out that liver extracts for oral administration are less effective than parenteral ones and also that more raw liver is required in their preparation. Under present conditions they therefore deprecate the use of oral preparations. The same objection does not apply to stomach extracts. Patients with chronic ailments are notoriously conservative, and sufferers from pernicious anæmia who have become stabilised on raw liver or on oral liver extract will not all welcome a change. But those who shy at the hypodermic needle will at least know they are helping to conserve the nation's food-supply with benefit to both their health and purse.

1. *Nature*, May 10, p. 264.

CARBON MONOXIDE

"The gas-mask does not prevent the absorption of carbon monoxide and the poisonous effects that might result, but gives full protection against all the gases used in warfare and discussed in the memorandum."

Correspondents have inquired with good reason whether the Ministry of Health in their memo to doctors on the diagnosis and treatment of gas casualties (reproduced in THE LANCET of May 10, p. 613) intended to imply that the gas-mask protects against the inhalation of carbon monoxide, say from broken gas mains. The first sentence in the concluding paragraph certainly bears that construction and "all these gases" should have been qualified by the words "used in warfare." As it is, we understand, too late to correct the official memo it would be advisable for all those into whose hands it comes to add to it the sentence at the head of this note.

Sir D'ARCY POWER, consulting surgeon and governor of St. Bartholomew's Hospital, died at Northwood last Sunday at the age of 85.

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1. Applications for such a test should be made to Prof. J. C. Drummond, Ministry of Food, Neville House, Page Street, London, S.W.1, together with a full medical history.

At the annual meeting of the section of psychiatry of the Royal Society of Medicine on Tuesday, May 27, at 4.30 P.M., Dr. A. B. Stokes and Dr. S. W. Hardwick will open a discussion on metabolic changes in periodic catatonia. At the section of medicine, which meets at the same time, Dr. Philip Ellman will read a paper on mass radiography of the chest, Dr. M. F. Maclagan on galactose tolerance in jaundice and Graves's disease, and Dr. C. G. Barnes on the electrocardiogram after pneumonectomy.

Special Articles

FLUOROSIS IN ENGLAND

THE GEOLOGICAL ASPECT AS A GUIDE TO PREVENTION *

By C. N. Bromehead, B.A. Oxfd, F.G.S.

Fluorine poisoning in its various forms, whether in man or other animals, has received considerable attention in many countries, notably in Denmark (Roholm 1937) and the United States (Getter 1939, and many others). In America, as early as 1936, Fink and Lindsay wrote: "With the rapidly increasing numbers of communities reporting fluorine-bearing waters, the occurrence of fluorine toxicosis has taken an added significance and is now generally recognised as a serious public-health problem"; in 1939 Nichols speaks of it as "a serious problem in water supply . . . throughout the world in general." In England this public-health problem is only now beginning to receive attention. Dental fluorosis was noticed by Ainsworth in Essex in 1933 and a few other cases have been mentioned; but a paper on fluorine in connexion with goitre (Wilson 1941a) and a discussion at the Royal Society of Medicine on fluorosis in man and animals in February last seem to be the first indications of any general interest in the subject.

In April, 1939, Dr. Dagmar Wilson wrote to the Director of the Geological Survey stating that her work on fluorosis in India had shown an interesting correlation with the geology of the regions investigated and that she intended to study the incidence of dental (and, if found, more serious) fluorosis in England; she asked for assistance on the geological aspect. It has been repeatedly shown that fluorine toxicosis, when not caused by fumes from factories known to be using that element, can be traced to drinking water, a fluorine content as low as one part per million producing effects. The study of water-supply from underground sources has always been an important part of the work of the Geological Survey, and, as an emergency measure, this work has recently been greatly intensified. When a disease traceable to water containing fluorine was to be investigated, it seemed only reasonable for the survey to indicate the possible sources of the fluorine. I was deputed to help Dr. Wilson in this way.

Fluorine, in the minute quantity regarded as dangerous, has in the past seldom been sought in routine analyses either of drinking water or of the sedimentary rocks from which most underground supplies are derived. Nor is it practical to suggest that any large number of such special analyses should be made. Large public water-supply undertakings could arrange to have samples examined in laboratories where the necessary skill and equipment are available, but most of the trouble arises from small-yielding wells serving single dwellings. Accordingly, it was decided that the investigation should follow two lines: first, that Dr. Wilson should visit any areas which as a geologist I considered likely, on a priori grounds, to give positive results; secondly, that she should examine children attending all schools in Oxfordshire and adjoining areas for signs of fluorosis (the choice of this region being a matter of personal convenience). It seemed probable that the distributional results of the second inquiry, collated with the local geology, would result in particular geological formations coming under suspicion; their outcrops in other parts of the country would then be added to the list of areas likely to give positive results.

Districts where fluorine is abundant in rocks have long been known, since the mineral fluorspar (calcium fluoride) is commercially valuable and consequently mined (Geological Survey Memoir 1922). It was thought desirable that some, at any rate, of these districts should be examined for fluorosis, although serious positive results were not considered likely. Fluorspar is a highly insoluble substance, only 0·004 g. dissolving in 100 c.cm. of water. In Derbyshire, perhaps the best known source of fluorspar, Sutton (1936) has reported on 43 drinking waters, of which only 1 had a fluorine content exceeding 1 p.p.m. (1·4) and 5 others exceeding half that amount. Dr. Wilson visited parts of Derbyshire, Durham and Westmorland where fluorspar is worked. Such signs of fluorosis as were detected were mostly in children using water derived from disused lead mines; fluorspar accompanies the lead-ore, and the practice of using water from such sources is obviously dangerous. A certain amount of fluorspar is found in Cornwall; in the china-clay district near St. Austell the fluorine vapours have given rise, in addition to the fluorspar which is a constituent of china-stone, to comparatively abundant fluorapatite; this mineral is a fluo-phosphate of lime and is much more soluble than fluorspar; its chemical formula is $Ca_{10}(PO_4)_6F_2$ corresponding to $Ca_{10}(PO_4)_6.(OH)_2$, that of hydroxy-apatite, which Thewlis (1940) has shown to be the inorganic constituent of teeth. At my suggestion Dr. Wilson paid a brief visit to this area and found numerous cases of fluorosis up to F_5 of Dean's grading. (1938), which runs as follows:—

F_1 = Normal	F_5 = Moderate (mottled)
F_2 = Doubtful	F_6 = Moderate (stained brown)
F_3 = Very light	F_7 = Somewhat serious
F_4 = Light	F_8 = Serious

Wilson has recently shown (Wilson 1941b) that a small intake of fluorine tends to produce immunity to dental caries. The greatest immunity was found by King (1940) in the island of Lewis; apatite is among the chief accessory minerals of the gneisses of which that island is composed. In this connexion it may also be noted that Westmorland, mentioned above as a fluorspar district, has the highest immunity to caries in England.

Apatite is fairly common amongst the heavier detrital minerals of sands and sandstones, which are frequent sources of underground water-supplies. Analyses of sands have usually been made on samples from surface exposures, and it may be that apatite is more abundant in beds under cover reached by boreholes. Any unusual concentration of this mineral might be a dangerous source of fluorine. More research in this aspect of the subject is desirable, particularly where sodium compounds, such as common salt, are present in the water; the formation of sodium fluoride must be considered, because that compound is a thousand times more soluble than calcium fluoride. Boswell (1915) has noted that apatite is abundant in a few samples of Thanet Sand in East Anglia, and Thresh (1916) has mapped the distribution of salt in the deep wells of Essex which derive their water from Thanet Sand and Chalk; many deep borings in Suffolk also give saline waters. The conjunction of these two factors may explain the fluorosis of the Maldon and other areas of Essex. This suggestion is supported by Schuck's (1938) experiments on rats. She concluded that there may be a relationship between the activity of fluorine in drinking water and the amount of sodium present, in that a high sodium content may mean that the greater part of the fluorine is present in the form of sodium fluoride, and this has been shown to be more toxic than the other forms investigated.

The affinity of the element fluorine for phosphate of lime is important in this connexion, but has not received much attention. It is known from the work of Carnot (1893) that fossil bones tend to acquire additional fluorine with age until a composition approaching that of fluorapatite is reached. Thus, if the proportion of fluorine to phosphate of lime in apatite is taken as unity, the relative proportion in modern bones is 0·058, pleistocene fossil bones 0·33, tertiary fossils 0·62, mesozoic fossils 0·91 and palæozoic fossils 0·99. This gradual concentration of fluorine as a comparatively soluble fluo-phosphate of lime is presumably related to the action of the element on teeth and bones which occurs in fluorosis, and it suggests that the dangerous quality of the Oxford Clay and other clay formations mentioned below is related to their content of saurian and fish remains, and that phosphatic deposits such as bone and coprolite beds would be specially dangerous. Phosphates having acquired fluorine from circulating water in geological time may yield it back to such water under conditions of depth and pressure which have not yet been studied; but analogous actions (for example the deposition of calcium carbonate as a cement in sandstones which now yield hard water) are familiar.

* Published by permission of the Director, Geological Survey of Great Britain.

In view of these facts I suggested to Dr. Wilson that she should investigate the incidence of fluorosis at localities situated on the Lower Greensand coprolite bed. Dr. K. P. Oakley (1940), who during the present war has been working for the Geological Survey on British resources of phosphates for fertilisers, drew attention to patches of this formation in Buckinghamshire, the chief localities being Great Brickhill, Bishopstone, Stone and Bow Brickhill. At Great Brickhill the phosphatic nodules in the bed are known to contain as much as 2·8% fluorine. Dr. Wilson's results confirmed the suggestion that this formation would give rise to dental fluorosis; amongst school-children from these and other localities in the district she found 17 cases (see table). The affected children at Flitwick, Ampthill and Maulden were living on the Lower Greensand, near its base, where the coprolite bed occurs. In every case in the series the child is known to have used water from a shallow well: at Great Brickhill and Bow Brickhill children who had always used water laid on from a public supply showed no sign of the disease.

NUMBER OF CASES OF FLUOROSIS FOUND AMONG SCHOOL-CHILDREN IN PARTS OF BUCKINGHAMSHIRE AND BEDFORDSHIRE (GRADED ACCORDING TO THE DEAN SCALE)

—	F_6	F_5	F_4	F_3	F_2	Total
Great Brickhill ..	..	1	1	1	2	5
Bishopstone ..	1	..	2	1	..	4
Stone	..	..	2	1	..	3
Bow Brickhill ..	..	..	..	..	2	2
Flitwick	1	..	..	..	..	1
Ampthill	..	..	..	1	..	1
Maulden	..	..	..	1	..	1

THE OXFORD CLAY

In Oxfordshire, where Dr. Wilson carried out her more intensive investigation, it was already known that one formation—the Oxford Clay—contained in one district as much as 480 p.p.m. of fluorine, and that its presence in another district was associated with much fluorosis among cattle. Dr. Wilson's cases of human fluorosis confirm that the Oxford Clay is often a source of danger. She also detected the disease in children of four localities in Bedfordshire lying on Oxford clay. Here again in every case the children affected came from cottages using their own shallow wells, whereas the results were negative in school-children at villages situated on the Oxford Clay but using water from a public supply which had had no contact with the clay. At Marston Moretaine we have a record of a well in the school yard of which the section is River Gravel 20 ft., Oxford Clay 65 ft., Great Oolite 10½ ft.; 55 ft. was a dug shaft—the rest bored. Though this well has long been disused, it is safe to assume that other wells at cottages were similar. Again in the area of Witney, of which about half is Oxford Clay, 14 out of 17 fluorosis localities are on that formation; shallow wells, sunk through superficial deposits to the clay, have been used. A number of houses at Headington Quarry are, or have been, dependent on their own wells; at one house fluorosis was serious, but there have been no further cases since 1935, when a public supply from the Oxford water company was installed. On the other hand, no cases of fluorosis have been detected in connexion with 5 wells in this district; details of the construction and depth of the various wells are not available, but it seems probable, in view of the evidence given, that those with fluorosis histories reach the Oxford Clay and those without it are wholly in Corallian beds.

OTHER JURASSIC CLAYS

In the Oxfordshire area, 7 localities, in addition to Headington Quarry, have shown animal fluorosis in varying degrees; all are on Kimmeridge Clay. The Lias also falls under suspicion; Dr. Wilson found fluorosis in 13 localities in Oxfordshire, in the area of Chipping Norton of which 11 are on Middle and Lower Lias and one on Upper Lias. I have already shown (Bromehead 1941) that Dr. Wilson's results in Somerset indicate that the lower part of the Lias or the highly phosphatic Rhætic bone bed a few feet underneath it, or both, are under suspicion of causing fluorosis in that county.

DISCUSSION

The exact distribution on geological formations of all cases of fluorosis found by Dr. Wilson is being noted and will become of increasing value as her research proceeds. The following conclusions may be given now. Well water which is either derived from or is in contact with any phosphatic beds or with some clays of marine origin (of which the Oxford Clay, the Lower Lias and the Kimmeridge Clay are the most important) is likely to cause human fluorosis. Wells in such formations are usually of small yield and serve individual cottages or small villages. Their use should be avoided; public supplies derived from other sources and under constant supervision as to quality are usually available. Borings passing through fluorine-bearing beds but lined with steel tubing to exclude contact are of course safe. With the possible exception of the Malden area (Ainsworth 1933) there is as yet nothing to suggest that processes for removing fluorine from the only available water will be necessary in this country, but such a process has been tested in the United States (McKee 1934, Elvove 1937).

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MEDICINE AND THE LAW

The Wrong Cylinder

A FATAL accident at a maternity hospital was investigated lately in the Airdrie sheriff court under the procedure which is to some extent the Scottish equivalent of the coroner's inquest. Two women suffering from toxæmia were admitted to the hospital and gave birth to children prematurely in the early part of March. Both babies required oxygen at frequent intervals. A member of the medical staff, entering the ward one afternoon, saw that the wrong cylinder was being used. Instead of the white-topped oxygen cylinder, the nurse was using an all-black cylinder of nitrous oxide. She had worked at the hospital for 30 years but somehow had failed to notice the mistake. The medical superintendent gave evidence that the fullest inquiries had been made and a new system of checking cylinders had been introduced. He confirmed the view of a previous medical witness that the condition of the babies was such that in any case it was unlikely that they would have lived—a point which, though possibly of some comfort to those concerned, is naturally in other respects immaterial. Incidentally the medical superintendent referred to the popular belief that a seven months' child would live; its life, he said, was always doubtful. The jury returned a formal verdict. Deplorable as are the results of such mistakes, it is not difficult to appreciate that hospital work in war-time is often conducted under great strain.

A Question of Infection

An inquest last month showed that a man, hitherto entirely healthy, had fallen from a scaffolding and had broken his pelvis. Taken to hospital in a north-western town, he was afterwards found to be suffering from some throat infection. He was then removed to an isolation hospital and placed in a ward where another patient was suffering from erysipelas and a third was suffering from

an abscess in the thigh. In this ward he died. Post-mortem examination showed death to be due to streptococcal septicæmia, contributed to by an abscess in the pelvis resulting from secondary infection of a bruised area in the pelvis. The coroner was naturally concerned to examine the possibility that the deceased became infected in a ward which contained patients suffering from hæmolytic and non-hæmolytic infection. There was evidence that, after treating infectious cases, the nurse changed her outer clothing and was disinfected. The house-surgeon said he did not think that the deceased contracted air-borne infection from the other two patients. Infection from the case of erysipelas was unlikely; infection from the case of abscess in the thigh was possible, but that case had remained only six hours in the ward. The coroner, recording a verdict of death by misadventure, said he could not exclude the possibility of infection from one of the other two patients, though it was fair to say that infection might also have come from elsewhere. It was perhaps more likely that the infection came from the ward because there was definite evidence of infectious cases there and no evidence of an infectious source elsewhere. In his opinion there had been no negligence or want of care on the part of anyone concerned.

Mental Hospital Kitchen not a Factory

In Wood *v.* London County Council a kitchenmaid employed at the Bexley Mental Hospital, whose right hand had been injured by an electrically operated meat machine, claimed damages from the L.C.C. for the negligence of their officials and alternatively for the failure to fence the machine as required by section 14 of the Factories Act. Mr. Justice Tucker found that the kitchen was a "factory" within the lengthy definition in section 151 (1) of the 1937 act; the mincing machine was dangerous and was not fenced as the act required; but, as he also found that the plaintiff had been guilty of contributory negligence, he decided in favour of the L.C.C. On her appeal the Court of Appeal said the kitchen was not within the act; if it were, extraordinary results would follow; work could not begin before 7 A.M. or continue after 6 P.M.—an impossible situation for the conduct of a mental hospital. A kitchen, he said, was not within the Factories Act even when carried on in a large way by people running a restaurant for trade or gain. But, even supposing the kitchen to be a factory, the Court of Appeal concurred in the finding of contributory negligence which was fatal to the plaintiff's claim. Hospital managements (which may be surprised by the suggestion that they carry on a factory) have often been advised to cover themselves by insurance against the risks of accidents and claims of this nature. The plaintiff's form of action obliged her to prove negligence or breach of duty; it was not like a workmen's compensation case where it is quite unnecessary to show that the employer was at fault.

THE A.M.A. CONVICTED

AFTER a trial lasting eight weeks the criminal proceedings at Washington against the American Medical Association, the editor of its *Journal*, and several other defendants has ended surprisingly. On the charge of conspiracy to violate the Sherman Act (the so-called "anti-trust" law aimed against monopolies) the association and also the district medical society at Washington have been found guilty while the eighteen individual defendants have been acquitted. Juries have the historical mission of mitigating the rigid logic of the law. There is patent inconsistency in a verdict which condemns two impersonal organisations while exempting from criminal responsibility the members and officers of those bodies; it is only by the agency of individuals that the suggested conspiracy could have been designed and conducted.

We summarised last month (*Lancet*, April 5, p. 457) the indictments and the opening speeches. The defendant organisations and practitioners were tried under a statute of Congress which forbids and punishes every combination or conspiracy "in restraint of trade" in the District of Columbia. Medical practice is "trade" for this purpose: so also is the work of hospitals or of other bodies which provide medical care. A society called Group Health Incorporated sought to furnish medical treatment on a flat-rate prepayment basis by salaried practitioners. The defendants were accused of conspiring to restrain Group Health from arranging medical and hospital care for its members and their dependants, to restrain the Group Health doctors and others in the District of Columbia from pursuing their avocation, and to restrain the Washington hospitals from doing their work. The defendants, it was said, tried to coerce doctors who might join or be consulted by the Group Health staff by threats of disciplinary proceedings and by obstructing the grant of hospital facilities. The defence replied that there was no criminal conspiracy but merely legitimate persuasion, and that any disciplinary proceedings were merely reasonable action taken in good faith under the Association's constitution and rules to protect the organisation and its standards of medical practice. The judge duly explained to the jury that the corporate defendants would be criminally responsible if authorised officers, acting for or in the name of the corporation, did acts within the apparent scope of the corporate powers in forming or furthering the alleged conspiracy. The reports of his summing up do not appear to justify any simultaneous finding of corporate guilt and individual immunity. It is reasonable to suppose that the jury reached its verdict (as so often) by way of compromise. The convicted bodies seem to have adequate material for an appeal. If the conviction stands, the result is that some highly distinguished medical practitioners have happily escaped being branded as criminals, while Group Health is given a chance to show what voluntary coöperative health insurance can do for classes of moderately paid citizens without interference from professional trade-unionism.

The evidence tendered to the jury occupies some 300 pages in nine successive issues of the J.A.M.A.[1] It is likely that one of the most impressive witnesses was Dr. Hugh Cabot, C.M.G., who will be known to many in Britain through his service with our medical units during the last war. He described his work at the Mayo Clinic at Rochester, Minnesota, where group practice has been carried on by salaried practitioners of good reputation. He said he was now working as medical director with a partnership of physicians for a body known as Health Services Incorporated, at Boston: there was remuneration by contract between the medical group and the business side of the undertaking: patients had the modern advantages of specialised treatment. Dr. Cabot traced the prepayment system back to the British friendly societies. He said it was not unethical for a doctor to take a salary from a group: there was no ground for refusing hospital facilities to a salaried doctor. He instanced also the Ross-Loos Clinic with its salaried staff, and the Stanacola (Standard Oil Co.) group formed in Louisiana at the instance of employees. He suggested a classification of "producer" organisations, set up primarily by physicians who offered medical care on a prepayment basis, and "consumer" organisations where the initiative came from the patients. Somewhere between these two he placed the industrial establishment which arranged for the care of workers in a particular undertaking and possibly also for that of their families. He cited the Southern Pacific Railroad's hospital arrangements at San Francisco. Group practice, he said, promoted preventive medicine. On the ordinary "fee-for-service" basis a doctor could not stop Jones in the street and say "You ought to have your children vaccinated"; under group-practice conditions he could do so. The witness saw no great danger to the principle of free choice of physician. Called by the prosecution, his evidence may well have had great influence upon the minds of the jury.

American comment on the trial indicates preoccupation with the trade-union aspect. Last February the Supreme Court of the United States held that, for the purpose of the Sherman Act and "restraint of trade," the labour unions are not really in trade or commerce at all. The occasion was a dispute involving a carpenters' union; irritated by the irresponsible tactics of the big American unions, critics have been swift to note that medical associations are deemed to be in trade while carpenters are not, and that a medical society can be schooled by the law courts while labour unions are, in a sense, outside the law.

1. *J. Amer. med. Ass.* Feb. 15 to April 12, 1941, incl.

PROTEIN NEEDS

IN the course of an address given on May 14 to the food group of the Society of Chemical Industry Prof. E. P. CATHCART, F.R.S., dealt with the vexed question of first-class protein. In actual practice, he said, the protein problem, provided the actual quantity does not fall below the physiological minimum (say about 50 grammes for an ordinary man), is only a matter of real concern where children, expectant and lactating mothers are concerned, and probably of the three the lactating mother runs the greatest risk as she makes the greatest demands on such protein as is available for the production of the protein of her milk.

THE GROWING CHILD

I do not mean to infer, said Professor Cathcart, that the provision of an adequate supply of good protein is not of importance to the growing child. It is. But, on the other hand, far too much stress is laid on this growth demand as the result of absorption in the results of animal experiments. It seems to be overlooked or forgotten that the growth of the child is, as compared with that, say, of a young animal like the rat, very slow, and hence the daily demand is small. The same may be said of the expectant mother. The intra-uterine growth of the 3·5 kg. newborn infant, containing approximately 550 g. of protein, is spread over a period of some 280 days—i.e., there is roughly a need of 2 g. per day (although in actual fact the need is not evenly distributed throughout the period of gestation). In the case of lactation, however, the quantity of protein secreted in the milk is quite substantial and must be made good from an adequate supply of protein in the diet. Prof. E. F. Terroine (Strasbourg) is very certain that "there is no *need* to include proteins of animal origin in the diet of man, whatever the stage of life considered and whatever the nature of the need to be satisfied," although he does admit, "it may be *useful* to include such protein if the staple food, which covers the energy expenditure, is very poor in protein and if the latter are of inferior quality. In such a case, the addition of milk or meat will enable the protein value to be raised to the requisite level, but the part substitution of one legume would have the same effect." We in this country have made provision for this contingency by the allowance of milk for children and expectant and nursing mothers.

THE MANUAL WORKER

It is easy to talk in an academic way about the quantity and quality of protein in the diet of the community. The question, however, may properly be asked: Do the members of the community in their daily lives accept these values? They do not. As Terroine says with a fair measure of truth, "it is a melancholy reflection that, as physiological knowledge advances, the dietary practice of civilised man tends to become more and more irrational; the more so, the higher the standard of living." There have been many changes in the dietaries of the people, even since the days of our grandfathers, both of those well endowed and of those less well endowed. In the first case there has been a most commendable reduction in the amount of food, in large measure protein, consumed. And among the less well endowed there has been, whenever possible, an increase in the consumption of protein, mainly in the form of meat.

Does hard manual work increase the need for an enhanced intake of protein? We constantly meet the demand of the heavy worker that, if he is to do his work well, he must have a good allowance of protein, usually in the form of meat. And yet at the same time there is the evidence of many investigators to show that the performance of very hard muscular work, provided the energy expenditure is covered, does not lead to any, or at the most a small, utilisation of the protein-rich muscle tissue, as evidenced, at any rate, by the output of nitrogen in the urine. This conundrum has intrigued me for the last thirty years at least. There is no question about the demand for meat by the man engaged in hard muscular work, be it the carrying out of his daily work or in the participation in sport, as evidenced for instance by the comprehensive inquiry made of the athletes taking part in the Olympic Games in 1936. The demand is clear but the why and wherefore is, to say the least of it, obscure. Is it possible the small, if any, increase in the output of nitrogen in the urine, provided the energy needs are covered by an adequate supply of carbohydrate and fat, is not a real index of the metabolic changes which are taking place in the body? It will be agreed that it is highly improbable that any tissue can be in a state of extreme metabolic activity for considerable periods without exhibiting some signs of wear and tear, which, normally, would be indicated by a rise in the output of nitrogen. It is possible that the breakdown does take place, but the nitrogen does not appear in the urine because resynthesis has taken place. Or, on the other hand, is the demand for increased meat not in reality a demand for more protein *qua* protein? Meat differs from the bulk of the proteins in that it is practically always associated with a tasty mixture of non-protein but nitrogen-rich extractives which account for the flavour of meat. Beef, which is rich in these tasty extractives, is generally preferred to mutton. These extractives, although they may have little or no protein sparing properties, are certainly amongst the most active stimulants for the flow of gastric juice. Hence a high proportion of meat in a necessarily energy-rich diet may be demanded as an adjuvant, either to assist by giving flavour to the diet, the bulk of which will be made up of less well-flavoured carbohydrate and fat, or to assist the digestion of this mass of food through stimulation of the flow of the digestive juices. Thomas, in his experiments on the biological value of proteins, was definitely of the opinion that the extractives of meat played some rôle in the utilisation of protein.

Again, it is possible that the well-known specific dynamic action of proteins is of very real use either in stimulating the other accessory metabolic processes, or the specific dynamic action which we can only recognise as increased heat production plays some profound but so far undetected rôle in metabolic exchange. Meat certainly possesses stimulating properties. Or, again, it is possible that the fat which is always present in meat exerts, in conjunction with the rest of the fat in the diet, its well-known action of retarding the emptying of the stomach, and this produces a comfortable feeling of satiety and prevents the speedy onset of hunger.

Infectious Disease in England and Wales

WEEK ENDED MAY 10

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1012; whooping-cough, 4081; diphtheria, 858; enteric fever, 41; measles (excluding rubella), 11,903; pneumonia (primary or influenzal), 1002; puerperal pyrexia, 120; cerebrospinal fever, 266; poliomyelitis, 6; polio-encephalitis, 0; encephalitis lethargica, 3; dysentery, 69; ophthalmia neonatorum, 80. No case of cholera, plague or typhus fever was notified during the week.

During the six weeks ended May 10 the weekly notifications of cerebrospinal fever maintained a steady level—335, 282, 326, 309, 323 and 266. In the current week Birmingham had 10 cases, the same number as in the previous week, London returned 16 (Lewisham 3) as against 38 in the previous week. In Scotland in the same period the numbers were 81, 54, 77, 97, 37 and 65.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 9 was 1755, including: scarlet fever, 222; diphtheria, 329; measles, 362; whooping-cough, 389; enteritis, 19; chicken-pox, 90; erysipelas, 53; mumps, 8; poliomyelitis, 1; dysentery, 39; cerebrospinal fever, 56; puerperal sepsis, 13; enteric fevers, 13; german measles, 13; encephalitis lethargica, 1; malaria, 2; other diseases (non-infectious), 69; not yet diagnosed, 76.

Deaths.—In 126 great towns there was no death from smallpox or scarlet fever, 2 (1) from enteric fever, 27 (0) from whooping-cough, 13 (0) from measles, 26 (2) from diphtheria, 39 (5) from diarrhœa and enteritis under 2 years, and 19 (0) from influenza. The figures in parentheses are those for London itself.

One fatal case of enteric fever was reported from Greater London and another from Rhondda. There were 6 deaths from whooping-cough at Manchester, 4 at Liverpool, and in the same week Glasgow reported 14.

The number of stillbirths notified during the week was 203 (corresponding to a rate of 39 per thousand total births), including 14 in London.

In England Now

A Running Commentary by Peripatetic Correspondents

THE announcement by the Minister of Health of the scales of payment for members of the nursing reserve has caused some heartburning north of the Border. Nurses writing to the *Glasgow Herald* during the past few weeks have taken the opportunity to draw attention to the unsatisfactory conditions of employment which still exist in the profession. One correspondent says that "the hours are long and arduous, the food and conditions leave much to be desired, and the treatment meted out by one's superiors is often harsh and childish." This makes melancholy reading for those of us who recall the findings of *The Lancet* Commission on Nursing nearly ten years ago. Hospital authorities who, during the past decade, have shown indifference to the problem of recruitment of nurses are now reaping a veritable whirlwind. One of the *Glasgow Herald's* correspondents points out that a probationer now receives £20 per year; on the other hand, any young woman answering Mr. Ernest Brown's trumpet call will have twice this amount. Thus, at a time when nearly all classes of workers are harping on the importance of their own contribution to the national effort, nursing is to suffer "dilution" by unskilled workers who will receive higher pay than the regular members of the profession. This Gilbertian state of affairs will not surprise the public because the public doesn't care a rap about nurses' working conditions until it is laid low with illness. Unfortunately the nursing profession has shown itself unable or unwilling to look after its own interests in the way that the medical profession has done by the formation of the B.M.A. Few physicians and surgeons would deny their indebtedness to nurses for indispensable help in professional work and in clinical research. It would be an appropriate gesture in acknowledgment of this valuable collaboration if the B.M.A. were to invite nurses' associations to become affiliated for the purpose of safeguarding the dignity and security of their profession. It may be argued that it is the duty of hospital managers and local authorities to look after the welfare of their nurses, and let it be said that a few hospitals are fully alive to their responsibilities. In general, however, doctors must be appalled by the indifference of the hospital administration to the comfort and convenience of their nursing staffs. I had a further reminder of this lately when I noticed that in one of the largest general hospitals in the country there is only one telephone for the use of the 400 nurses. This instrument is also used by some 200 ward-maids and other domestic workers. I often see nurses who have come off night-duty standing in a queue in a draughty corridor awaiting their turn to use the telephone. The absence of a queue usually means that the telephone is out of order. Perhaps these minor inconveniences will be remedied when Mr. Brown's highly paid recruits arrive at the hospital.

* * *

We hear a great deal nowadays about racial purity, but what about racial impurity? Our Empire contains members of almost every major and minor race group in the world, yet information about its racial composition is sparse and disappointing, and Mr. K. L. Little's suggestion (*Eugen. Rev.* January, 1941, p. 114) of a comprehensive investigation of the results of mixing (miscegenation, as the eugenists call it) of the various stocks of different parts of the Empire is worth thinking about. But much preliminary work will have to be done before the scheme is likely to appeal to the man-in-the-street or the man-in-the-cabinet, for neither the professional anthropologist nor the eugenist has won the confidence of the British electorate, partly because the object of their work has not been stated in a form appreciable to all and partly because there is so little harmony among themselves as to what methods of research are likely to produce reliable information. What we really want to know about the mixture of races and its results should be plotted out, submitted to the British Association for criticism and discussed in the press, so that the importance of the subject may be widely understood. Then the details of the methods of examination to be adopted by all observers should be settled. That this, together with finance, will be the most difficult task of all was brought home to me in a committee of the Anthropological Institute, formed at the beginning of the present war under the chairmanship of Prof. Ruggles Gates, to decide what measurements should be made on the mass of soldiers now quartered all over Great Britain. We had the greatest difficulty in agreeing on some six or eight measurements; I hope that our time was not thrown away for I have heard nothing of the scheme since.

Probably the most useful records of the results of mixing British with other stocks will lie in psychological and mental rather than anatomical tests, though undoubtedly the head shape is worth recording since it tells something about the brain within. Then, too, the capacity for breeding under adverse conditions is important, as instanced by the fact that the round-headed Alpine race has outbred the Nordic all over the centre of Europe, and Britain has only been saved (or denied) from being outbred by it by the Channel. A preliminary examination of the hybrid stocks already evolved from a mixture of European with other races would be valuable. Let the American anthropologists, statesmen and administrators of justice tell us their views of the mental and physical characters of the new half-caste population established in their country; its fertility, reliability, mental capacity and adaptability first, and then its physical characters. Let us know what the West Indian specialists think of the half-castes, quadroons and octoroons of their islands, and let us have the unbiased observations of East Indian experts on the Eurasian or *chichi* population of India, and so on. Only let us realise that the mental characteristics of its mixed races are far more important from an Imperial point of view than the physical, though these should not be neglected.

Many medical men and women who come into contact with mixed races, although they may not claim the distinction, are very real anthropologists since they have to study mankind both mentally and physically. Scotland Yard, magistrates, missionaries, lawyers and editors, all of whom are anthropologists in the broad sense and many of them in touch with half-castes, could and would give their experience. But it is for the professional anthropologist to suggest the points on which knowledge is needed and to arrange for the supply of such simple apparatus as is necessary for the appropriate tests. As Prof. J. B. S. Haldane has said, the study of racial crossing will take generations to complete, and any attempt to start it now would probably fail, because people have so many more urgent things to think about; but Mr. Little's suggestion is a good one and will doubtless mature when times are quieter.

* * *

The time of the singing of birds is come. A clear blue sky and brilliant sunshine streaming down the Clyde valley made an irresistible appeal; the family decided that the time was ripe for resuming our Sunday walks which had been discontinued during the long and dreary winter. Following our usual practice, we left the road about a mile beyond the village and struck across country. The magnificent panorama of the highlands began to open out before us, and on the higher ground we saw the familiar outline of Ben Lomond dominating the countryside for a score of miles around and still capped with a layer of dazzling snow. The children, walking through the long grass or foraging among the bushes on the look-out for nests, were the first to remark that everything was dusty. In the open country, 15 miles from Glasgow, this was indeed remarkable. I carefully snipped a dozen leaves from a bush and allowed them to fall into an envelope in true Thorndyke style. When we got home I took the leaves and gently brushed the dust on to a microscope slide. It was composed mainly of amorphous gritty particles, mica and soot, but here and there were minute fragments of building brick. This then was the destination of a part of the dust cloud raised a few days before in the Clydeside blitz. And it should not have surprised me when I can just remember the dusty sunsets here after Krakatoa blitzed itself 10,000 miles away.

* * *

"Platoon!" screamed the sergeant," platoon . . . for inspection . . . port ARMS!" The commanding officer of the village platoon of Home Guard, wearing his balmoral, walked briskly to the head of the three ranks

drawn up outside the church hall. Scrutiny proceeded amid silence, except for a low muttering from the officer and the periodic rattling of rifle-bolts. Occasionally snatches of conversation floated over the heads of the soldiers as the C.O. and the sergeant made their way from man to man: "... safety-catch ... oily rag ... all that muck ..." On the extreme left there were three of us who had not yet qualified for rifles, but the C.O. cast a critical eye over our other equipment. As he stood facing me I fixed my gaze on the row of service ribbons on his tunic, and I could almost feel his penetrating stare while his eyes passed from forage cap to jerkin and from jerkin to boots and gaiters. It was at that moment that I saw his jaw protruding in prognathic fashion and his eyes screwed up to signal disapproval. The sergeant, sensitive to the smallest gesture of his commanding officer, looked down at my feet. I restrained the impulse to abandon my stance, but with that acumen born of clinical practice I sought an explanation by taking a sidelong glance at the sergeant's face. There I saw unmistakable evidence that something was amiss. His facial contortions were those of a patient when the doctor's icy hand descends on an unsuspecting abdomen. There followed a muttered conversation between the C.O. and the sergeant and then they moved down the rank. In a couple of minutes I heard them walking behind the front rank to regain the head of the platoon. As they pass me, the C.O. stopped and hissed something into my ear that made me feel as though I had just inhaled a full dose of amyl nitrite: "You've got your gaiters on back to front!"

* * *

Last night, looking at one episode in a vast battle with my binoculars, which brought it twelve hundred times closer, I spied a neutrophil, like some Pompeian warrior fixed in time, decorated with five pairs of gonococci, and fell to wondering. Did any doubts ever assail him, deflecting him from his duty? Did he say: would that I were an eosinophil which is a reserved occupation, or in the lymphocytes which are the Home Guard? Did he think of the honour of his old home in the bone-marrow, of the school where he was a myelocyte? As he went into the fray did he fling recrimination back into the lymph stream, saying it was that cortical cabinet that got us into this war, they had no control over the thalamus, they are hormone addicts, they are senile, sheltering behind Fischer's platelets, they are poisoned to obstinacy and complacency by the toxic spawning of the columnar epithelial cells? No, I think not. He went into the fight with keenness, flinging his arms round each foe and his ferment into the struggle, reckless with his allotted span of twenty days. As a fresh-run salmon leaps in cleanness, as a tern darts to his quarry, as any creature does that for which a million centuries have perfected it, so gloriously did this warrior fight on the urethra. I salute thee my—no, somebody else's—servant.

* * *

Having taken to horticulture late in life and then only under the stress of war, I do not aspire to climb very high in that profession; indeed, I shall be content if, after a promising start as a general labourer, I may be permitted to work my way not so much up as sideways. It is my privilege to toil and sweat under the critical eye of a gardener who is not only a tiger for work but also apparently omniscient. I think that he suffers (if I may coin a phrase) from an inferiority complex, for he is constantly telling me that he can turn and break ground more rapidly, and till it more neatly, not only than I can (which would be damning himself with faint praise), but than anyone else in the world. I strive hard to win his moderate approval, to secure for myself a modest pat on the head, but so far without success. "I could do it in 'arf the time, doctor," he said one day while watching me fork and clean a most uncompromising piece of virgin ground. "And so you ought," I retorted, a trifle nettled. "I'd like to watch you handle half a dozen tricky confinements." This silenced him for a time, after he had grudgingly conceded that 'twas every man to his trade. But his omniscience and omnipotence are not restricted to gardening. Even the astonishing course of the current war has occasioned him no surprises. After every major episode, especially the more unpleasant ones, he produces the same formula: "'Tis turned out zackly as I said 'twould be, doctor. What I can't see is why our chaps don't ——" and here follows some masterpiece of offensive action such as razing Berlin to the ground overnight or invading Italy. "They ought to ask you to give 'em a hand, Bill," I reply with becoming gravity. A deprecating smile overspreads his features. "Ah, that's wad Missis says. 'Er gets proper wicked wi' me. I doan know why you doan go out and 'elp 'em, er says, you're sich a bliddy know-all." I take off my hat to Mrs. Bill. But he's been foxed at last. He actually admitted to me that he did not expect Rudolf Hess to bale out over Scotland. Frankly, I am disappointed.

Parliament

THE recent appeal for American doctors to help us has made us all stop to think whether we are really making the best use of our doctors here, men and women, British and foreign. In the House of Commons on May 13 Sir HENRY MORRIS-JONES frankly said that he thought there had been a good deal of chaos and muddle in the treatment of alien and allied doctors. Incidentally, he said the term "alien doctor" often gave offence. We spoke of the Allied forces but we called individuals aliens. The scarcity of doctors resulting from war conditions had been aggravated by maldistribution, and last January the Government had recognised the principle that foreign medical men should be used when they passed the temporary registration regulation. This decision had been confirmed by the Robinson Committee, who indeed recommended that the employment of foreign doctors in the services should be further extended. But so far out of 1400 available roughly only 100 foreign doctors had found employment in this country. He asked for an explanation of this dilatoriness. No doubt there had been a little lack of good-will on the part of the medical profession and hospitals, but if it had been put to our hospitals that alien doctors were ready to offer their services he was sure that they would have accepted them. The fault lay in the multiplicity of departments, and serious delay at the aliens department of the Home Office was the crux of the hold-up. At the present rate it would take three years to absorb these alien doctors. After accepting an applicant the hospital authorities communicate with the Central Medical War Committee, which then sends forms to the hospital and to the applicant. The C.M.W.C. reports the application to the aliens department of the Home Office which sends out more reference forms, and when the department gives its O.K.—after a delay which might be as much as two months—the form is returned to the C.M.W.C. to be sent by them to the General Medical Council for final confirmation. Eventually the form goes back once more to the C.M.W.C., which communicates with the hospital, and finally the hospital communicates with the applicant. The House was not surprised to hear that the supply of forms at the C.M.W.C. had now run out and was causing further delay. Sir Henry asked members if that was the way for a great nation to carry on its affairs. Was it any wonder if alien doctors felt rather sore? He was a great believer in an Anglo-American union, and he made a plea that the enthusiasm of the Americans should not be blunted by the obtuseness of the English official mind. They should not be discouraged by being put in the R.A.M.C. to clean instruments for a few hours a day. But we should not shout from the housetops about asking 1000 American doctors to come here while we were doing an injustice to alien medical men who had been amongst us for so long, and to refugees who had had to leave their homes.

Our medical man-power was very badly distributed. In rural areas it was often impossible to find a doctor to attend even a confinement. The public were uneasy when they could not get medical attention in a civil area, and owing to the peculiar character of this war the R.A.M.C. seemed to have an avaricious appetite for medical personnel, although there is not much work for them to do. The C.M.W.C. had done valuable work, but the situation had got beyond them. He urged the Minister of Health to review the distribution of medical men and women. He should appoint committees in each county, or in each county borough of over 250,000 population, composed of a representative of the B.M.A., a

responsible and fair-minded public man from the county, and representatives of the trade-unions and the employers.

Sir FRANCIS FREMANTLE said the C.M.W.C. (of which he was a member) welcomed criticism. He emphasised that the committee was not the British Medical Association. It was set up by agreement with independent bodies like the Royal Colleges of Physicians and Surgeons and direct representation was given to those outside bodies. He thought it was probably the most representative body of the medical profession that could be obtained. It was obviously better that these matters should be dealt with by the profession as a whole rather than by a Government department. The C.M.W.C. was as keen on using the services of alien doctors as anybody, but it was not so easy as it might seem to employ them. In the first place most of them could not talk English and there were few openings in research and laboratory work. But as opportunity offered they were being fitted in.

Prof. A. V. HILL, F.R.S., said this country had been unexpectedly fortunate so far in the matter of our public health. But already our medical resources were taxed to the utmost. Even in ordinary times we should not have more than half to two-thirds of the doctors needed if the families of insured men were to be treated as well as the men. In war-time, even more than in peace, we had to think ahead and not merely treat disease when it had already occurred. Every year 3000 deaths from diphtheria, and 60,000 cases, could be abolished if we only thought ahead and if doctors were available to carry out the necessary immunisation. But if we were to avoid disease, treat the wounds of war, disease resulting from fatigue, from temporary food deficiencies and from abnormal conditions due to enemy action, then far more doctors were needed. We could only welcome with gratitude the promise of the United States to send 1000 doctors to help us. But in view of our need it seemed to him appalling that we should have 1300 doctors from Europe unemployed out of the 1400 available. The story that our people would not accept them and that our hospitals did not want them seemed to be nonsense. Many of these doctors spoke English well enough, and the people who raised these objections were often disguising their own prejudices by referring them to the common people.

Miss F. HORSBRUGH, parliamentary secretary to the Ministry of Health, assured the House that there was no complacency on the part of the Ministry about the employment of alien doctors. They had to make certain that the doctor, if he was to go into our hospitals, had skill and that his training had been what he professed it to be. It was also necessary to make sure that he was loyal to this country. She admitted that the machinery had worked too slowly, but it was not so bad as had been alleged. The number of alien doctors was 1350 and now 200 or 250 were being employed. At present the numbers coming through from the Home Office were about 100 a week. Many of these doctors were specialists, and it was not always possible to employ them in their own specialty. The need today was principally for doctors to fill junior posts in hospitals, and some of these alien doctors would not be suitable for that. It had been suggested that local committees should be set up to deal with the distribution of doctors, but that was exactly what had been done. Perhaps Sir H. Morris-Jones thought that other people should be coöpted on those local committees and that was being considered. She had listened to the criticisms and she had not heard any suggestion as to how they could have a better organisation to deal with the alien doctors. It was better that the machinery should work rather slowly than that a mistake should be made about a doctor's skill or his loyalty.

QUESTION TIME

Medicine-Stamp Duties

In answer to a question Sir KINGSLEY WOOD, Chancellor of the Exchequer, stated that the separate bill referred to in the budget speech will contain the repeal of the medicine-stamp duties as well as the provisions consequential upon that repeal. The bill will be presented to Parliament shortly.

Paper Supplies for Scientific Journals

Mr. J. H. WOOTTON-DAVIES asked the Minister of Supply whether he was aware of the refusal of the paper control to control the supply of paper to newspapers and periodicals in such a way as to give a reasonable preference to those publishing scientific and educational matter and important news, as opposed to those which could not be held to provide anything more than diversion and entertainment; and whether he would investigate this matter with a view to ensuring a better use of the available paper supplies.—Sir ANDREW DUNCAN replied: The limited supplies of paper available are allocated among the various existing newspapers and periodicals according to their previous usage, and it is not for me to judge the comparative merits of their contents.

Horseflesh as Food

Colonel W. H. CARVER asked the Parliamentary Secretary to the Ministry of Food whether he was aware that a certain admixture of horseflesh with beef was taking place in various articles of popular consumption; whether, if such admixture was small, it needed to be specified on the container or whether it could be regarded as a permitted amount of adulteration.—Mr. E. BROWN, Minister of Health, replied: I understand that, to some extent, the practice referred to is being adopted. Apart from the general provisions of the Food and Drugs Act 1938, for the protection of purchasers, including those relating to labelling, the act contains detailed provisions relating to the sale of horseflesh and articles of food containing it, the administration of which is a matter for the local authorities. I have no authority to interpret or dispense with the statutory requirements.

Grievances of Scottish Male Nurses

Replying to a question Mr. T. JOHNSTON said the conditions for transferred male mental nurses in Scotland have now been assimilated to those applicable to similar officers in England and the provisions operate retrospectively from the same dates. The new conditions briefly state that where a married officer is required to transfer his home he will be paid £1 1*s.* per week or be provided with free billeting and that officers who can arrange to remove their homes will be refunded their removal expenses. In addition there are allowances to unmarried officers who have continuing liabilities.

Vaccination Deaths

In answer to a question Mr. BROWN announced that the number of death certificates received during the year 1939 where vaccinia or vaccination was mentioned or the death was attributed to vaccinia or vaccination, and the ages in each case were as follows: Non-civilians; 1 at 20 years; Civilians: 1 at 4 months, 1 at 31 years.

Deaths from Smallpox

In answer to a further question Mr. BROWN said that the 1939 smallpox case was notified in the Liverpool port health district and the one in 1940 in the port health district of Southampton. The Southampton case was vaccinated in hospital after the appearance of the rash. Information as to the vaccination of the Liverpool case is not available.

Family Allowances

In replying to a question from Miss E. RATHBONE on a state scheme of family allowances, the CHANCELLOR OF THE EXCHEQUER said that an estimate had been prepared of the cost of paying an allowance of 5*s.* a week in respect of each child under 15, and the matter was being investigated.

A HOSPITAL FOR A.R.P. WORKERS.—Mrs. Joan Woollcombe's country hospitality scheme has passed many a civil defence worker from the front line of the blitz to peaceful homes in the countryside for a few days of very necessary rest. But frequently more than a few days' relief must be found, and for this purpose the first convalescent hospital specifically for A.R.P. workers, planned by Lord Horder and Mrs. Woollcombe, has been set up by the War Organisation of the Red Cross and St. John. It was opened on May 15 by Field-Marshal Sir Philip Chetwode, who hoped that it might be the forerunner of similar hospitals throughout the country. It lies in a Buckinghamshire village, and the Misbourne, a stream famous for its disappearing trick over long stretches in a dry summer, meanders through its grounds. The youngest part of the village church is 15th century and the farm owned by Turstin Mantel in the days of our last successful invader is still Mantel's Farm. For those in dire need of peace and quiet as well as treatment to restore them to health it is difficult to think of a happier choice within so short a distance of the front line.

Letters to the Editor

"EFFORT SYNDROME"

SIR,—There have recently been many learned and careful articles on effort syndrome in the medical journals. If one's experience were limited to reading these alone, one would come inevitably to the conclusion that effort syndrome was a definite common disease, that was created in the beginning, walked out of the Ark, and brought forth after its kind. The Oxford dictionary definition of syndrome is "a concurrence of several symptoms in a disease," so that if the word syndrome is used one is justified in assuming that it represents a definite disease process. However, one's experience is not limited to the journals. One sees patients. And here I would like to put forward a purely personal point of view, which may arouse some disagreement; but I do not apologise for it, for it is sometimes profitable to question the value of established concepts. In seven years of very varied psychiatric practice I have never seen a case of effort syndrome. Since the beginning of this war I have been constantly seeing Army and Air Force patients, and though looking for the condition I failed to find it. Had I been missing it? In view of its importance as judged by the press this seemed extremely odd. Had I lost my ability to diagnose patients and correlate my reading with clinical experience? Or perhaps I was calling it something else, or again, even more rebellious thought, perhaps there was no such thing. Obviously the latter view was most pleasing to me, and hence this letter a mere popgun (or sling?) breathing a brief defiance at some of the heaviest artillery which it is the pride of the medical profession to muster. After all, did not Group-Captain Symonds recently beard the psychologists in their own den? I will take courage and proceed. Even a psychiatrist is entitled to do his bit of bearding.

To elucidate this problem I thought of several cases I had seen which might have been diagnosed as suffering from this mysterious complaint. One in particular impressed me. Let us call him "The Marine who was Angry."

I was called to see a 24-year old marine, a burly well-built fellow, complaining of tremor, palpitations, pain over his heart and excessive sweating. Instead of diagnosing effort syndrome however, I had taken a history which led to a rather different conclusion. A healthy and somewhat hot-tempered fellow, he had carried out his duty on board his ship in the Indian Ocean until 5 months previously. He had lent £4 to a mate who had failed to return it. A fight resulted. He was brought before the captain who said that not only had he disturbed the ship with brawling but he had also broken regulations by lending money. Discipline must be preserved, he would therefore forfeit the money and do ten days C.B. The marine did his punishment, but with black rage in his heart. On ending it he went on parade. The officer inspecting stopped opposite him and said "Look at this silly fellow (or words to that effect). What do you mean by coming on parade with long hair like a girl?" The marine trembled, his heart raced, he sweated from every pore in his body, he grasped his rifle, he raised it a little from the ground to bash the officer for such an ill-timed insult. But fortunately he restrained himself. The palpitations and the sweating and the trembling however recurred whenever he was with an officer, especially that officer. This was noticed, and he was asked what was the matter. Not considering it tactful to reply, "Because I want to bash you, Sir," he said he just felt bad and trembly. He was sent to the M.O., an officer in whose company the symptoms persisted. He was put in a shore hospital in Africa. A physician there demonstrated him before five students as a case of Graves's disease, saying that he would never be well until he had his thyroid out. This gave the marine food for thought. He was obviously really ill. He began to suffer from choky feeling, pain round the heart and thought perhaps he had heart trouble too. Fortunately no surgeon could be persuaded to attack his throat, and during the next four months he gravitated slowly, through many hospitals, to England.

His mental state when I saw him could be summarised as one of pent-up fury. An opportunity to tell his story, general appeasement, and release of some of his anger, helped him greatly. It was at first difficult to persuade him that he was not really ill, but demonstration as a case not suffering from Graves's disease or heart disease, in front of fifteen students, finally persuaded him of his healthiness. There were many other difficulties about which he needed help, such as his desertion by his mother at an early age, his early struggles in an orphanage, his intolerance to authority, his sensitivity to criticism and his intention never to marry because his mother had failed in her duties. One could give these psychological factors names like frustrated Oedipus complex or over-compensated inferiority complex, if one had a taste for jargon, but it would serve no useful purpose. Nor does it serve any useful purpose to call his bodily symptoms by the name "effort syndrome." Simple psychotherapy on the above lines enabled him to return to duty within three weeks with his aggression directed to more useful channels and unlucky would be the German foe who should cross his irate path.

There are many similar cases to this. This man was not suffering from any disease at all, except perhaps what Mr. Russell Howard used to call "iatrogenic" or doctor-produced disease.

The symptoms of the anxiety state are protean, but it is surely illogical to split off the cardiac symptoms and dignify them with the high sounding term "effort syndrome." Why not gastric syndrome, head syndrome, abdominal syndrome? I would suggest that the effort syndrome represents no disease at all. It is only an idea, an idea which served a useful purpose in the last war, but it is now an idea which has outlived its usefulness. Cannot all the cases at present classified as effort syndrome be more reasonably diagnosed as (1) suffering from anxiety state; (2) post-infective neuro-circulatory asthenia—e.g., after 'flu; (3) undiscovered organic disease, such as sinus infection, early tuberculosis, or even cardiac rheumatism or syphilis; (4) cordite poisoning; (5) weedy fellows who can't do much at all? Effort syndrome, in fact, is strictly analogous to the term "vapours" as used in the eighteenth century to cover conditions such as early tuberculosis, vaso-vagal attacks, petit mal, hysteria and tight corsets.

Guy's Hospital. FELIX BROWN.

PITUITARY SHOCK

SIR,—Your leader of May 10 on pituitary extract in obstetrics reminds me of an experience some years ago. I was called out to see a case in a so-called twilight sleep maternity home where the night nurse, through ignorance or carelessness (or both), had been giving the patient, instead of hyoscine hydrobromide gr. 1/400, an injection of pituitary extract 1 c.cm. every hour for at least four hours. I found the patient profoundly shocked. Her face was cold and clammy; her pulse was rapid, about 160 and of small volume; she had sighing respirations. The uterus was in tonic contraction. She was obviously suffering from pituitary shock, and I thought we were going to lose her. The foot of the bed was raised by placing it on the seat of a chair, hot-water bottles were placed in the bed and extra blankets added, and hot tea with plenty of sugar was given by mouth. In half an hour her condition had improved and next day, with the aid of a little chloroform to relieve the terminal pains, she gave birth to a full-term child which seemed not to have suffered in any way.

London, N.1. C. HORWITZ.

ZINC CHLORIDE FOR FIRE FIGHTING

SIR,—It has come to my knowledge that solutions of zinc chloride are being sold to the public for attacking incendiary bombs through the stirrup hand-pump. I am informed that these solutions contain about 70% of zinc chloride, and it seems right to issue a warning against the use of such solutions, especially in confined spaces. Zinc chloride in this strength is a corrosive poison, and if some of it got into the eye it would be extremely painful, it would produce temporary blindness, thus immediately incapacitating the operator of the pump, and even if effectual treatment was applied at once permanent damage would be likely to result.

I am further informed that when these solutions are brought into contact with burning magnesium, fumes of hydrochloric acid and zinc chloride are evolved. If such fumes are inhaled there may be serious effects in the respiratory passages. Finally, if such solutions come into contact with the skin and are not washed off they may cause skin lesions.

I am not in a position to express any opinion as to whether such solutions are greatly superior to water in dealing with incendiaries and the fires caused thereby, but I do express the opinion that, unless this be so, the possible dangers involved from their use are such that it would be most undesirable for the public to have unrestricted use of them.

St. Mary's Hospital, Paddington. G. ROCHE LYNCH.

SULPHADIAZINE

SIR,—The clinical trials with what you call in your annotation of Feb. 15 a promising new sulphonamide —sulphadiazine—have exceeded much of the original hopes for it. It has been found to be exceedingly well tolerated by the human body, much better so than sulphathiazole or sulphapyridine. Whether or not it is inherently more active, as you have pointed out, is questionable, but higher blood concentrations are well tolerated in man as was suggested by the experimental work with animals. This has resulted in more effective action on the ætiological agents of the various infections in which it has been used. These have included pneumococcal, streptococcal, Welch bacillary, staphylococcal and Friedländer's bacillary infections. The effect of sulphadiazine on refractory cases of gonococcal infections in man is being investigated by Dr. Hugh H. Young and his co-workers at the Johns Hopkins Hospital. Experimentally type A as well as type B Friedländer's bacillary infections have been successfully treated with sulphadiazine. Experimentally, also, the work in progress at the school of medicine of the University of Rochester indicates that sulphadiazine is much more effective in the treatment of Welch bacillary infection than any of the other sulphonamides. This infection was produced in dogs in such a manner that it very closely simulates gas gangrene as it is found in the field.

Stamford, Conn., U.S.A. W. HARRY FEINSTONE.

"SCIATICA"

SIR,—It was gratifying to note that Dr. Walshe agrees with me in stressing the frequency with which sciatic neuritis is wrongly diagnosed. The diagnostic criteria which he lays down for this complaint, such as "pain along the course of the nerve, pain on pressing or stretching the nerve, pain and tenderness in muscles supplied by it," were however present in my 70 cases, and it was precisely these signs that had led to the diagnosis of sciatic neuritis by various doctors whose competence cannot be doubted. These signs are so familiar to us all, that in my case-reports they were for brevity covered by this single term "sciatica." The fact that Dr. Walshe still regards these signs as reliable evidence of neuritis shows a happy disregard for the mass of original work which has been done on this subject during the past 30 years, and suggests that the diagnosis of sciatic neuritis will continue to be made with great frequency.

Leavesden Hospital. J. H. KELLGREN.

ENDOCARDITIS LENTA

SIR,—May I ask Dr. Parkes Weber in what way his case of subacute bacterial endocarditis, and the others mentioned by him, differ from the well-known clinical picture of the bacteria-free stage described by Libman (*Amer. J. med. Sci.* 1913, **146**, 625). I have seen at least one case recently in which the blood-culture was repeatedly negative and even at autopsy bacteria were not found in the vegetations. Neither heparin nor sulphonamides were used in this case. In reviewing cases of endocarditis lenta it should be remembered that spontaneous remissions occur, and that the disappearance of organisms from the blood and heart valves in no way negatives a fatal termination to the disease.

Westminster Hospital. MAGNUS HAINES.

CARBON MONOXIDE

SIR,—In the official memorandum on Gas Casualties printed in your issue of May 10 (p. 613) should not the first sentence of the concluding paragraph, which reads "The gas-mask, if adjusted properly and in time, gives full protection to the lungs and eyes against all these gases" have added to it the words "*except carbon monoxide*"?

Oxford. A. G. SANDERS.

Obituary

GEORGE THEODORE ROBERTSON WATT

M.B. ABERD.; SURGEON LIEUTENANT, R.N.V.R.

Surgeon Lieutenant G. T. Robertson Watt is reported to have been lost during the evacuation of the Imperial Forces from Greece, and the Admiralty have intimated that he must be presumed to have been killed on active service. Watt, who was in his 29th year, was the eldest son of Mr. Theodore Watt, LL.D., managing director of the Aberdeen University Press, and Mrs. Watt of Culter House, Aberdeenshire. He spent 13 years at the Aberdeen Grammar School, and during his last year he was a prefect. He graduated in medicine at Aberdeen University in 1936, and became assistant to Dr. George Mitchell of Insch. The following August he was appointed a resident medical officer at Aberdeen Royal Infirmary. Later he became house-surgeon at Mount Vernon Hospital, at the Aberdeen Maternity Hospital, and at the Jessop Hospital, Sheffield, for he had already determined to specialise in obstetrics and gynæcology. In June of last year he was commissioned as a surgeon lieutenant in the R.N.V.R., and shortly afterwards was posted to H.M.S. *Wryneck*.

Elliott & Fry

L. F. writes: George Watt had a wide interest in student activities but was happier breathing the free air of the Cairngorms than on the organised playing-field. He was willing to fight and die for his country, knowing that liberty itself was in jeopardy, but had he been spared to see his country victorious he would still have fought on for the creation of peace and unity among nations. His vision was the wide vision of youth.

JOHN MURDOCH McKILLOP

M.B. GLASG.; LIEUTENANT, R.A.M.C.

Dr. J. M. McKillop was educated at the Kelvinside Academy and Glasgow University. He was a young man of powerful physique, keen on all sports. At school he played rugger and he was an enthusiastic yachtsman; for many years he competed in the Loch Long dinghy class. He qualified M.B. in 1938 and held resident appointments at three of the corporation hospitals — at Stobhill Hospital he was house-physician to Prof. Noah Morris. McKillop was a careful worker and his frankness combined with a well-developed sense of humour made him popular with his patients. He joined up as soon as war was declared and he served as a lieutenant in the R.A.M.C. attached to the 2nd battalion of the Seaforth Highlanders. He went to France in October, 1939, and on June 11, 1940, he was wounded at Ingouville-sur-mer, Seine. He died the same night.

Weir, Glasgow

Murdoch McKillop was the only son of the late Mr. Jack McKillop and Mrs. Nora McKillop. He was 26 years old.

The Minister of Food has made an order, to come into force on June 2, prohibiting, except under licence, the manufacture or sale of vitamin C. The order does not apply to the manufacture or sale of vitamin C for medicinal, pharmaceutical or scientific purposes. Applications for licences should be made to the Ministry at St. John's College, Oxford.

IRELAND

A HOSPITAL BED BUREAU FOR DUBLIN

A BED bureau for the hospitals which have received grants out of the Hospital Trust Fund will shortly be set up in the Dublin area. Under the Public Hospitals (Amendment) Act, passed just a year ago, the Hospitals Commission was empowered to establish this organisation; the thirty hospitals concerned have each had the right to nominate a member of the advisory committee which framed the regulations for the control of the bureau, which now only await the approval of the Minister to come into force.

The bureau will probably be located in the office of the Hospitals Commission, and it will know the vacant beds available at each of the hospitals. Applications for admission should be supported by a recommendation from a medical practitioner, giving the age and sex of the patient, and a provisional diagnosis. In an emergency this procedure will, of course, not be required. The applicant will be asked to name the hospital to which he would choose to be admitted and the member of the staff under whose care he would wish to be placed. If, from lack of accommodation, his choice cannot be satisfied, he will be informed of any alternative accommodation available. The prospective patient or his medical attendant will, therefore, be assured so far as possible of a free choice of hospital and member of staff. To begin with the bureau will operate only during the day, but later it is hoped to maintain a twenty-four hour service.

At one time there was some anxiety lest the regulations would encourage interference by the Hospitals Commission with the independence of the voluntary hospitals, but it is understood that this point has been met. Other difficulties, however, remain, and the current number of the *Journal* of the Irish Free State Medical Union remarks editorially: "The real obstacle to the efficiency of the Dublin Bed Bureau is not likely to be any friction between the Commission and the hospitals but the crude fact that there is and will be a gross shortage of hospital accommodation."

A HOSPITALS SWEEPSTAKE

The draw of a further hospital sweepstake, held in connexion with the Irish Lincoln Handicap, was held on May 10, and the hospitals benefited by over £7800. This is a small sum compared with the results of the sweeps in earlier years, but the decline is not surprising. The wonder is rather that it is possible to hold a sweepstake with any success. The hospitals, however, are glad to get what they can, and are loth to let the machinery pass with disuse. It was announced that another sweep would be promoted this autumn.

Births, Marriages and Deaths

BIRTHS

BROCKINGTON.—On May 14, the wife of Dr. Fraser Brockington, of Leamington Spa—a son.

HOUSE.—On May 12, at Carmarthen, the wife of Captain R. J. House, R.A.M.C.—a daughter.

VAIZEY.—On May 11, the wife of Dr. J. Michael Vaizey, of Tycehurst Hill, Loughton, Essex—a daughter.

WENGER.—On May 10, at Leicester, the wife of Mr. Reginald Wenger, F.R.C.S.E.—a daughter.

MARRIAGES

FISHER—CORBETT.—On May 10, at Portland, Herbert Holdrick Fisher, surgeon commander, R.N., to Venice Margaret Corbett.

FRAULO—HAMILTON-KEENE.—On April 26, in Cheshire, Joseph Fraulo, M.R.C.S., of London, to Marguerite Hamilton-Keene.

DEATHS

AHERN.—On May 10, in Dublin, Michael David Ahern, O.B.E., L.R.C.P.E., lieut.-colonel R.A.M.C. retd.

POE.—On May 12, in Edinburgh, John Poe, C.M.G., D.S.O., M.B.Dubl., colonel, R.A.M.C. retd.

POTTER.—On May 18, at Lochfoot, Dumfries, Paul de Cressé Potter, M.R.C.S., L.S.A., formerly of Leicester.

POWER.—On May 18, at Northwood, Sir D'Arcy Power, K.B.E., B.M. Oxfd, F.R.C.S., F.R.F.P.S., F.R.A.C.S., F.S.A., aged 85.

ROWE.—On May 16, at Wisset, Halesworth, Edmund Lewis Rowe, L.R.C.P.E., of Lowestoft, aged 81.

SUTTON.—On May 12, at Tunbridge Wells, Alexander Arthur Sutton, C.B., D.S.O., L.R.C.P.E., major-general A.M.S. retd.

Medical News

University of Oxford

Miss Ida Mann has been appointed to the Margaret Ogilvie's readership in ophthalmology. Dr. C. G. Douglas has also been appointed university reader in general metabolism, and Dr. H. M. Sinclair university demonstrator in biochemistry.

Royal College of Surgeons of Edinburgh

At a meeting of the college held recently, with Dr. H. M. Traquair, the president, in the chair, the following were admitted to the fellowship:—

G. J. Cleland, M.B., Edin.; G. J. A. Kirkpatrick, M.D. Manitoba; F. B. Korkis, M.B. N.Z.; J. C. Milne, M.B. Edin.; D. M. Nundy, M.B. Rangoon; Marion A. Pearson, M.B. Glasg.; O. M. Spence, M.B. Sydney; and W. J. Watt, M.B. N.Z.

War-time Formulas

The British Pharmaceutical Codex Revision Committee has had under consideration suggestions for adapting formulas to the position of the drug market, which has, of course, been affected by the restrictions on the importation of the vegetable raw materials of medicine. The committee has made recommendations to the War Formulary Committee, some of which reflect suggestions made in M.R.C. War Memorandum No. 3 on economy in the use of drugs in war-time. The statement in the memorandum that economy in the use of alcohol is essential is supplemented by the direction that many tinctures can be replaced by concentrated preparations; the revision committee agrees provisionally, and is having a list prepared of the liquid extracts which might be employed. The committee is also in accord with the suggestion that arachis (peanut) oil should replace olive oil in compound phenol ointment and lead oleate ointment, and should supplant almond oil in rose-water ointment and white rose ointment. A proposal that compound infusion of quassia should be included among the formulas as an alternative to compound infusion of gentian is approved pending the examination of samples. The committee agreed to retain the monograph on solution of acriflavine, but also decided to introduce a new formula consisting of proflavine in physiological saline solution. A new suspending agent is to be sought, for aspirin mixture, to replace tragacanth which is now a scarce and costly substance. The following formula is recommended as a substitute for compound linctus of squill:

℞ Camphorated tincture of opium . .	m 20
Oxymel of squill	m 20
Liquid extract of squill . . .	m 1
Syrup to	m 60

A note is to be inserted: "If liquid extract of squill is not obtainable, liquid extract of ipecacuanha may replace it." It was suggested that the use of liquid paraffin in liniment of ammonia should be avoided, but the committee decided that the use of light liquid paraffin should be permitted. The following formula is to replace the existing codex formula for soap spirit: caustic potash 2·8; caustic soda 2·1; oleic acid B.P. 29; water 31; industrial alcohol (90%) to 100; neutralised to Poirrier's blue. It was agreed that the use of tap water should be authorised in place of distilled water except for injections and in cases where the pharmacist decided that it is unsuitable for a particular preparation. A suggestion to alter the formula for red lotion by substituting Bordeaux B for compound tincture of lavender was not accepted. Because of the shortage of materials and because there are pharmacological objections to deflagrating powders, it was proposed that compound lobelia powder and compound stramonium powder should be discarded, but this was not agreed to; nor were proposals to omit ipecacuanha from compound phenolphthalein pills, and to replace compound glycerin of thymol by a simpler formula such as the one used by the L.C.C.

The 42nd annual meeting of the Lebanon Hospital for Mental Diseases, Syria, will be held on Thursday, June 5, at the Westway Hotel, Endsleigh Street, London, W.C.1, under the chairmanship of Mr. Lyn Harris, LL.B. Other speakers will include Mrs. Somerville Smith, representative in London of the British-American Ambulance Corps, and Monsieur Mathieu, formerly interpreter at the League of Nations, who will speak on the situation in Syria. In spite of troubled political and social conditions, the hospital has continued its work without interruption, and 391 new patients were admitted during 1940, a higher number than ever before.

Notes, Comments and Abstracts

THE IMPETIGOCOCCUS

BY R. E. HOPE SIMPSON, M.R.C.S.

MAY 21 of this year marks the diamond jubilee of a modest paper by Radcliffe Crocker (1881) on the "Contagium of Impetigo Contagiosa." This was the prelude to a problem which is not yet solved. This is remarkable because since 1864, when Tilbury Fox clearly described impetigo contagiosa, no disease has been more readily recognised or more easily treated, and few present such abundant material for study in such an accessible situation. The failure is at least in part attributable to the diversion of the investigation along two side-lines concerned to decide first, whether the causal organism of impetigo contagiosa is a streptococcus or *Staphylococcus aureus*, and secondly whether or no pemphigus neonatorum is the infantile form of impetigo contagiosa. These diversions could have been avoided if the investigators had held clearly in mind an important preconception imposed by the natural history of the disease.

Tilbury Fox himself searched unsuccessfully for organisms in the fluid from the vesicles, and American and continental workers were only able to record the occasional presence of fructifying fungi in the crusts. These fungi Crocker discounted as contaminants and used a capillary tube to withdraw fluid from the unruptured vesicles, a method developed successfully twenty years later by Sabouraud. Crocker described and illustrated "chains of micrococci" from immediate examination of the fluid. This was three years before Fehleisen's recovery of the streptococcus from cases of erysipelas. Crocker cautiously admits that further observation, culture and experiment are required to establish his organism as causal of impetigo contagiosa. Nevertheless the battle was on, a germ had been specified, and Crocker must rank as the first sponsor of the streptococcal theory. Since that date the fight has had its remissions of a dozen years or so when the issue seemed settled, but each time discussion has broken out afresh. One such remission occurred after 1900 when the streptococcal basis seemed established. Another period of quiet is with us now, with the *Staph. aureus* uneasily enthroned.

An opposing claimant to Crocker's organism appeared when Balzer and Griffon recovered a staphylococcus from the lesions of impetigo contagiosa. But later (1897) they repeated their work, discovered technical imperfection and once more incriminated the streptococcus. Almost immediately Sabouraud entered the lists with hot championship of the *Staph. aureus*, but he too repeated the work of Balzer and Griffon, and in a series of papers (1900) generously admitted his errors, commended the work of Balzer and Griffon to his colleagues, and with elaborate care attempted to establish the claim of the streptococcus. His two warnings are worthy of reproduction: examine early or you will find the secondary invader; and solid media (which he details) favour the growth of the common skin invaders—incubate them at 37° C. and next day the tubes will be covered with yellow colonies, "résultats faciles et faux." He also notes how rapidly various cocci appear in the fluid in a blister raised by a burn.

The researches of Sabouraud seemed, in spite of a few hostile critics, finally to settle the matter, and when others had confirmed his work pemphigologists were left free to explore the second side issue—the relationship between impetigo contagiosa and pemphigus neonatorum. This produced a crop of papers, such as that of Whitfield who in 1903 described pemphigus neonatorum in an infant whose mother was suffering from impetigo. In the same year Adamson maintained that pemphigus neonatorum was the infantile form of the impetigo of Tilbury Fox. Three years later Clegg and Wherry suggested the term "pemphigus contagiosus" to cover the disease, whether it appeared in adults or in infants. Despite a few dissentients, the relationship was at that time generally accepted as established, and the causal organism was supposed to be a non-specific streptococcus.

In 1927 Falls broke the interval of peace by reasserting what he had earlier stated (1917), that he had isolated *Staph. aureus* from the lesions of pemphigus neonatorum, and that his organism fulfilled Koch's postulates. This reinforced the conclusions of McCandlish who two years earlier had inculpated the *Staph. aureus* in his report on 224 cases of "impetigo of the newborn." Most workers since then have supported these findings, but the textbooks I have sampled seem uninterested in the matter (Park and Williams 1929, Stitt 1941, Whitby 1928). Muir and Ritchie (1937), in a paragraph on diseases caused by hæmolytic streptococcus, dismissed the point with these words: "Impetigo is generally attributed to these organisms."

A SPECIFIC CAUSAL ORGANISM

In my view the causal organism of impetigo contagiosa is an organism special to that disease. This conclusion can be reached without recourse to the microscope by anyone who has opportunity to deal with impetigo. It is based on the following facts:

1. Impetigo contagiosa is a clear-cut clinical entity, of which recognition is usually easy. Atypical cases occur, but not more often than in most diseases.

2. It breeds true. Case follows case with the uniformity of measles. Contacts of impetigo contagiosa do not through this infection primarily develop furuncles, erysipelas, cellulitis, or osteomyelitis. Nor do erysipelas, cellulitis, furunculosis, carbuncle, osteomylelitis or scarlet fever ever give rise to impetigo contagiosa.

3. It has a definite pathological picture, and involves a precise anatomical location for its lesions.

4. Impetigo contagiosa can be readily and uniformly cured by measures which will not affect other staphylococcal and streptococcal conditions.

Were we informed that the causal organism of measles had been discovered to be simply the streptococcus of scarlet fever, unworthy of species differentiation, we should be certain that the conclusion was erroneous. Nature provides indisputable evidence, both for measles and for impetigo contagiosa, that there is a germ in a measure peculiar to each of those diseases. Whatever their behaviour, tinctorial or cultural, outside of their natural habitat, these are specific organisms. Yet Sabouraud gave it as his opinion that the streptococcus of impetigo is not special to impetigo but is "the typical Fehleisen streptococcus of erysipelas, &c." Such a misconception is astonishing in such a clinician. The situation of pemphigus neonatorum is perhaps less clear, but it is instructive to quote Falls (1927) that the organism which he recovered from this disease "was culturally and tinctorially indistinguishable from a staphylococcus recovered from an ordinary boil." On another occasion, however, he notices certain peculiarities of this coccus, particularly that its morphology varies on different culture media; but "these differences," he concludes, "do not seem sufficient for considering the pemphigus coccus as a different species."

There is more direct evidence of the specificity of the coccus of impetigo. For several years I have examined direct smears, Leishman and Gram stained, of vesicle material from many hundreds of cases of impetigo contagiosa. These, with great regularity, show the presence, often in large numbers, of strongly gram-positive diplococci, many of which lie in the cytoplasm of the polynuclear cells. Short chains and other formations are seen extracellularly, but the characteristic finding is of these gram-positive intracellular diplococci. So reliable is this finding in typical uncomplicated impetigo that it has become for me a routine test in the rare atypical cases, and has proved its usefulness. The observation that the diplococcal form is the natural morphology of the organism of impetigo is by no means new; priority is usually given to Demme (1886), but Demme's diplococcus was recovered from a case of pemphigus acutus investigated for its rarity.

Clegg and Wherry (1906) described 5 cases of pemphigus neonatorum and 1 of "pemphigus contagiosus" from which diplococci "similar to those described by Almquist" were recovered. Superficial examination of cultures of this organism might lead, they said, to confusion with the *Staph. pyogenes aureus*, though direct smears from the lesions showed well-defined kidney-shaped diplococci. Cultures did not produce indol in broth, and the diplococcus form reappeared in subculture in milk, or better in serum-broth. The one

human inoculation produced typical but abortive vesicles. They emphasised that its natural habitat and absence of invasiveness distinguished this organism from "ordinary pyogenic cocci." They suggested that the disease ("pemphigus contagiosus" to cover all its manifestations in infant and adult) was probably due to their organism, which should be called *Micrococcus pemphigi contagiosi*.

Almquist's paper appeared in 1891, and concerns pemphigus neonatorum. Before describing his bacteriological researches he gave strong a priori reasons for supposing that the pemphigus coccus was a specific organism. He isolated an organism culturally and tinctorially very similar to the *Staph. pyogenes aureus*, but—and here his preconception guided him—it produced a typical pemphigus vesicle when inoculated in his arm. Therefore it cannot have been identical. He pointed out that the delicacy of infant skin makes infants especially liable to attack, and that adults (e.g., nursing mothers) are prone to modified attacks, their skins being tougher. His description of adult attacks is not detailed enough for the reader to decide whether it represented impetigo contagiosa. The natural form of the organism was usually diplococcal. It bred true during months of subculture, and Almquist named it *Micrococcus pemphigi neonatorum*. His paper and that of Clegg and Wherry should be studied in comparison with that of Falls. The bacteriological findings are similar, but the conclusions are opposed.[1]

This pemphigus coccus may or may not prove to be identical with that of impetigo. But it should be widely recognised that impetigo contagiosa is caused by an organism as specific as is the *Neisseria gonorrhœæ* for gonorrhœa. Whatever the ultimate scientific name of this organism, it deserves the semi-vulgar title of the "impetigococcus." It is worthy of more attention and of more honourable mention in our textbooks, not only because of the commonness of the infection but also because the germ itself is interesting. The impetigococcus has a precise anatomical site in a constant tissue of election. There it provokes a serous reaction with a mild pyogenic response, and leaves no immunity. Like the gonococcus, the impetigococcus is commonly found intracellularly in the polynuclear pus cells, and such bacteria often present peculiar cultural difficulties. Unlike the gonococcus, it is strongly gram-positive. Inoculation of the impetigococcus into the skin of other animals does not reproduce the human disease, the germ being invasive in animals. Examination of the direct smear is of great assistance clinically.

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A YARDSTICK FOR NUTRITION

FEW problems of modern medicine have proved more baffling than the search for a ready reckoner of nutritional status and few are more in need of solution at the present time for the pædiatrician, the medical officer of health, the general practitioner, teacher, health visitor and social worker. Miss Rachel Jenss, Sc.D., and Dr. Susan Souther[2] have made an exhaustive examination of the various indices which have been put forward for assessing physical fitness in children. But, disappointingly, they are driven to conclude that these indices are neither selective nor sensitive. They find that only full use of several well-worn methods of assessment can be expected to provide a measure of any value, and even such time-honoured methods as the clinical estimate of nutritional status, growth and development and dietary habits need to be used in conjunction with one another; singly none of them can be relied on for an accurate diagnosis. Thus the clinical judgment of nutritional status even by a trained pædiatrician is "liable to considerable error." Their work has been done thoroughly, and though it still leaves us without a universal measure of nutrition it has all the value of a negative finding gained by careful analysis and critical judgment.

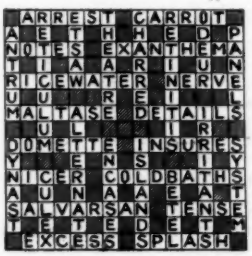
1. Good illustrations of the impetigococcus can be found in Sabouraud's book (1928) and in the "British Encyclopædia of Medical Practice," 1938, vol. VII, p. 85. There is a good photograph of the pemphigus coccus in the first paper by Falls, where it shows a strong resemblance to the intracellular impetigococcus.
2. "Methods of Assessing the Physical Fitness of Children." U.S. Department of Labor, Children's Bureau, Publication No. 263.

THE HANBURY MEDAL

THE Memorial to Daniel Hanbury takes the form of a gold medal given periodically for "high excellence in the prosecution of promotion of original research in the natural history and chemistry of drugs." It is to be awarded this year to Mr. Harold King, D.Sc., F.R.S. of the National Institute for Medical Research. The adjudicating committee is made up of the presidents of the Chemical, Linnean and Pharmaceutical Societies, the chairman of the British Pharmaceutical Conference and one pharmaceutical chemist; their decision was announced at the May meeting of the council of the Pharmaceutical Society, who are the trustees of the fund raised to establish the memorial. The new Hanbury medallist has been closely engaged in research work on drugs for nearly thirty years. His important contribution to the problem of the synthesis of arsenical preparations and his work on the chemistry of alkaloids and sterols are well known. His results have been outstanding in the investigation of the constitution of hyoscine, the stereochemistry of the cinchona alkaloids, into the sources, nature and constitution of the alkaloids present in the various kinds of curare, and of the plants used in the preparation of that substance. Some ten years ago, in association with Rosenheim, he suggested a new structure for the cholic acid ring system which is now generally accepted as a basis for the representation of a number of physiologically active substances, such as the œstrogenic hormones, carcinogenic hydrocarbons and cardiac glucosides.

Since publication of the last list of subscriptions to the Medical War Relief Fund over £1200 has been received, bringing the total to over £25,000.

The Reich *Official Gazette* for May 18 announces reductions in German food rations which will begin in June. The weekly meat ration is said to be going to drop from 500 grammes (about 17½ oz.) to 400 grammes (about 14 oz.), and families who keep a pig, cow, rabbits or poultry will be allowed about 7 oz. less per person weekly.


ARREST CARROT
A E T H H E D P
NOTES EXANTHEMA
T I A A R I U N
RICEWATER NERVE
U U R E I L
MALTASE DETAILS
U L I R
OOMETTE INSURES
Y E N S I Y
NICER COLDBATHS
A U N A A E A T
SALVARSAN TENSE
T E T E D E T
EXCESS SPLASH

SOLUTION TO THE LANCET CROSSWORD OF MAY 17

Appointments

BURNETT, C. W. F., M.D. Lond., M.R.C.O.G.: acting deputy medical superintendent at Stepping Hill Hospital, Stockport.
MITCHELL, ELIZABETH M., M.B. Lond.: resident assistant medical registrar at the Royal Free Hospital.
VELLACOTT, H. D. S., M.B. Camb.: senior assistant R.M.O. at Alton Hospital, Winchester.

The following examining Factory Surgeons have been appointed:
FLEMING, J. B., M.D. Glasg.: Markinch, Fife;
GATELY, G. L., M.B. Lpool: Stoney Stanton, Leicester;
HARRIS, A. G. J., M.B. Camb.: Sherborne, Dorset; and
MILLIGAN, E. H. M., M.D. Belf., D.P.H.: Longdendale and Glossop, Derby and Chester.

The following Medical Referees have been appointed:
INGRAM, P. C. P., M.B. Lond.: all county-court districts in circuit No. 24 and Aberdare and Mountain Ash, Merthyr Tydfil, Pontypridd, Ystradyfodwg and Porth, and Bridgend in circuit No. 30, for dermatitis and other skin diseases;
LEWIS, D. R., M.D. Edin., F.R.C.P.E.: all county-court districts in circuit No. 31 and Neath and Port Talbot in circuit No. 30 for dermatitis and other skin diseases; and
WEIR, R. S., M.B. Glasg.: sheriff-court districts of Dunfermline and Kinross.